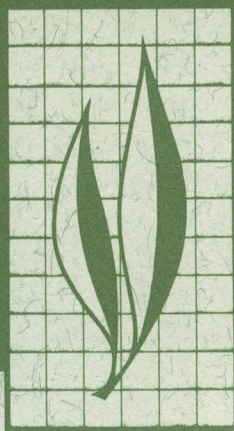


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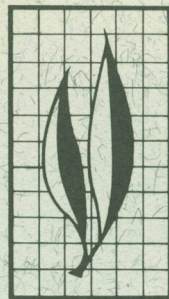
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Distribution and Ecology of Stream Fishes in the San Francisco Bay Drainage

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The distribution and ecology of fishes in 457 sampling sites on 175 streams of the San Francisco Bay drainage, California, was determined between 11 May and 10 October 1981. Of 35 species collected, 22 (63 percent) were exotic to California and 13 (37 percent) were native. Urbanization has resulted in the alternation and destruction of many stream habitats within the basin, and in changes in the dominance of fish assemblages from native to introduced species. Four native species, *Rhinichthys osculus*, *Eucyclogobius newberryi*, *Pogonichthys macrolepidotus*, and *Gila crassicauda*, are apparently extinct in study area streams in which they historically occurred. Several other species, *Oncorhynchus kisutch*, *Mylopharodon conocephalus*, *Hysterocarpus traskii*, and *Archoplites interruptus*, have experienced significant reductions in their ranges. The abundance of native fishes was positively correlated with the occurrence of other native species primarily in stream habitats with little noticeable human disturbance. The abundance of introduced fishes shows a significant negative correlation with the occurrence of native species. Introduced fishes occurred primarily in large, highly disturbed pools at low and intermediate elevations, often in channelized stream sections. Local extinctions of isolated populations of native fishes throughout the basin will continue to occur should aquatic habitat alteration continue at its present rate.

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Steelhead trout (*Salmo gairdnerii gairdnerii* Richardson) caught in upper Alameda Creek by San Francisco Water Department pipeline surveyors, circa 1935.

Photograph courtesy of East Bay Regional Park District

Distribution and Ecology of Stream Fishes in the San Francisco Bay Drainage¹

INTRODUCTION

THE SACRAMENTO-SAN JOAQUIN RIVER complex is divided into at least seven freshwater provinces or "subsystems" based on the degree of geographic isolation and speciation demonstrated by the fish fauna (Moyle 1976a).² Only recently has the ecology of the native and introduced fish fauna of several of these subsystems received detailed study: Pit River (Moyle et al. 1982; Cooper 1983); Clear Lake (Hopkirk 1973; Moyle et al. 1982); Pajaro-Salinas (Moyle et al. 1982); and Central Valley (Moyle 1976a, 1976b; Moyle and Nichols 1973, 1974).

Because of similar fish fauna, streams tributary to San Francisco Bay historically have been viewed as an extension of the Central Valley subsystem (Snyder 1905; Hopkirk 1973; Moyle 1976a). Of the 17 species endemic to the Sacramento-San Joaquin system, 10 are known from streams within the San Francisco Bay drainage. Until this study, the San Francisco portion of the Central Valley subsystem has not received systematic investigation of any ecological aspect of its fish fauna. The extensive alteration of aquatic habitats of the San Francisco Bay drainage and the lack of previous studies illustrated the need for a comprehensive study of the distribution and ecology of native and introduced freshwater fish assemblages in streams within this drainage. Consequently, between 11 May and 10 October 1981, a survey of streams throughout the San Francisco Bay drainage subsystem was conducted to provide comprehensive information on the distribution and ecology of fishes occurring in these streams. As part of this larger study, collections and distributional records from public agencies, universities, and museums were examined with the purpose of consolidating available historical information on fish distribution into a single source.

Streams of the San Francisco Bay drainage differ, however, from typical Central Valley streams in several important ways. First, all Bay drainages flow directly into San Francisco Bay, which acts as an effective barrier to the migration of primary freshwater fishes between drainages. Only during years of exceptionally high runoff in the Sacramento-San Joaquin River system will San Francisco Bay surface waters become dilute enough to allow primary freshwater fishes to migrate between drainages (Snyder 1905).

Second, the stream/bay tidal interface at the mouth of each drainage is a fluctuating transition zone between salt and fresh waters. This estuarine transition zone supports both fresh/brackish and fresh/saltwater species assemblages adapted to tolerate diel tidal fluctuations, widely fluctuating salinity levels, silt substrate, turbid water conditions, and often warm water temperatures. Single species are found within the same stream with separate populations adapted to each extreme of the salinity gradient. As an example, *Gasterosteus aculeatus* Linnaeus often appears within the same stream as an anadromous form *G. a. aculeatus* Linnaeus at the freshwater/tidal interface and a freshwater form *G. a. microcephalus* Girard in the middle and headwater reaches.

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²These partially isolated subsystems include: (1) Central Valley, (2) Goose Lake, (3) Pit River, (4) north coastal streams, (5) Clear Lake, (6) Pajaro-Salinas, and (7) upper Kern River.

Third, the intermediate and lowland sections of Bay drainage streams flow through heavily urbanized environments. As a consequence, most streams have modified channels for flood control. Modification of the channel, creation of barriers to fish migration, elimination of riparian vegetation, and deterioration of water quality are all noticeable consequences of urbanization. Even in headwater regions, these streams have been adversely affected by erosion and siltation caused by residential development and cattle grazing.

Rapid urbanization with concomitant alteration and destruction of aquatic habitats during the last century dramatically changed the original associations of native fishes found in some San Francisco Bay streams (Skinner 1962; Aceituno et al. 1976; Leidy 1983). The extinct minnow *Gila crassicauda* (Baird and Girard) was once considered one of the most abundant cyprinids in the Central Valley subsystem (Mills and Mamika 1980). Historically, it also occurred in the San Francisco drainage basin (Miller 1963). Certain formerly abundant native species such as *Archoplites interruptus* Girard, *Hysterocarpus traskii* Gibbons, and *Eucyclogobius newberryi* (Girard) either have been reduced in numbers or extirpated from much of their historical range (Moyle and Nichols 1973; Moyle 1976a; Camm Swift, personal communication). Today these species, although limited in distribution, persist in a few streams within the San Francisco Bay drainage.

STUDY AREA

The basin of San Francisco Bay³ drains an area of approximately 9,000 km². The study includes 175 streams, comprising 457 individual localities between the elevations of 1 m and 900 m. Virtually all perennial streams draining into San Francisco Bay are represented. Portions of Alameda, Contra Costa, Santa Clara, San Francisco, San Mateo, Marin, Sonoma, Napa, and Solano counties are included. Names of individual streams are presented in table 1, followed by a number corresponding to their location in figure 1. During the study period many streams were intermittent, in part because precipitation was below average during the winter of 1980-81. As a result, normally perennial streams often consisted of isolated pools in intermittent streams.

Riparian vegetation associated with the study area streams varied with each drainage. In general, at lower elevations, streams were bordered by willows (*Salix lasiandra*, *S. laevigata*), cottonwood (*Populus tridentata*, *P. fremontii*), red alder (*Alnus oregona*), and several species of grass. Urbanized areas were characterized by blackberry (notably *Rubus nitifolius* and *R. ursinus*) and weedy exotics. Coastal live oak woodlands (*Quercus agrifolia*) dominated streamside vegetation in dry Coast Range foothills, while blue oak (*Q. douglasii*) and valley oak (*Q. lobata*) occasionally were present. Redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseudotsuga menziesii*) were primarily restricted to the higher elevations along streams in the coastal fog belt. Most channelized portions of streams were devoid of native riparian vegetation.

³San Francisco Bay, as defined here, includes San Francisco, San Pablo, and Suisun bays, and limited portions of the West Delta. The Sacramento and San Joaquin rivers were not included in this study.

TABLE 1. STREAMS LISTED BY DRAINAGE FLOWING INTO SAN FRANCISCO BAY*

Marsh Creek (1)†	Canada de los Osos Creek (58)
Mt. Diablo Creek (2)	San Felipe Creek (59)
Walnut Creek Drainage (3)	Fisher Creek (60)
San Ramon Creek (4)	Silver Creek (61)
Sycamore Creek (5)	Metcalf Canyon Creek (62)
Green Valley Creek (6)	Miguelita Creek (63)
Tice Creek (7)	Thompson Creek (64)
Grayson Creek (8)	Babb Creek (65)
Pine Creek (9)	Berryessa Creek (66)
Las Trampas Creek (10)	Calera Creek (67)
Lafayette Creek (11)	Arroyo de los Coches Creek (68)
Bolinger Creek (12)	Guadalupe River Drainage (69)
San Catanio Creek (13)	Los Gatos Creek (70)
Arroyo Hambre Creek (14)	Hooker Gulch Creek (71)
Rodeo Creek (15)	Austrian Gulch Creek (72)
Refugio Creek (16)	Briggs Creek (73)
Pinole Creek (17)	Rincon Creek (74)
Garrity Creek (18)	Ross Creek (75)
San Pablo Creek Drainage (19)	Canoas Creek (76)
Bear Creek (20)	Alamitos Creek (77)
Lauterwasser Creek (21)	Arroyo Calero Creek (78)
Wildcat Creek (22)	Saratoga Creek Drainage (79)
Cerrito Creek (23)	McElroy Creek (80)
Cordonices Creek (24)	Bonjetti Creek (81)
Sausal Creek (25)	San Tomas Aquinas Creek Drainage (82)
Peralta Creek (26)	Vasona Creek (83)
Arroyo Viejo Creek (27)	Smith Creek (84)
San Leandro Creek Drainage (28)	Calabazas Creek Drainage (85)
Redwood Creek (29)	Prospect Creek (86)
Moraga Creek (30)	Stevens Creek Drainage (87)
Indian Creek (31)	Swiss Creek (88)
San Lorenzo Creek Drainage (32)	Permanente Creek Drainage (89)
Palomares Creek (33)	Hale Creek (90)
Cull Creek (34)	Adobe Creek (91)
Crow Creek (35)	Barron Creek (92)
Eden Canyon Creek (36)	Matadero Creek Drainage (93)
Alameda Creek Drainage (37)	Deer Creek (94)
Arroyo Mocho Creek (38)	San Francisquito Creek Drainage (95)
Altamont Creek (39)	Bear Creek (96)
Arroyo las Positas Creek (40)	Bear Gulch Creek (97)
South San Ramon Creek (41)	West Union Creek (98)
Tassajara Creek (42)	Alambique Creek (99)
Arroyo de la Laguna Creek (43)	Corte Madera Creek (100)
Arroyo Valle Creek (44)	Los Trancos Creek (101)
Cayetano Creek (45)	Redwood Creek Drainage (102)
Sinbad Creek (46)	Arroyo Ojo Creek (103)
Stoneybrook Creek (47)	Cordilleras Creek (104)
Isabel Creek (48)	Belmont Creek (105)
Arroyo Bayo Creek (49)	Laurel Creek (106)
Smith Creek (50)	San Mateo Creek Drainage (107)
Beauregard Creek (51)	Polhemus Creek (108)
Colorado Creek (52)	Sanchez Creek (109)
Calaveras Creek (West Branch) (53)	Easton Creek (110)
Mission Creek (54)	Mills Creek (111)
Coyote Creek Drainage (55)	Colma Creek (112)
Lower Penitencia Creek (56)	San Antonio Creek (113)
Upper Penitencia Creek (57)	

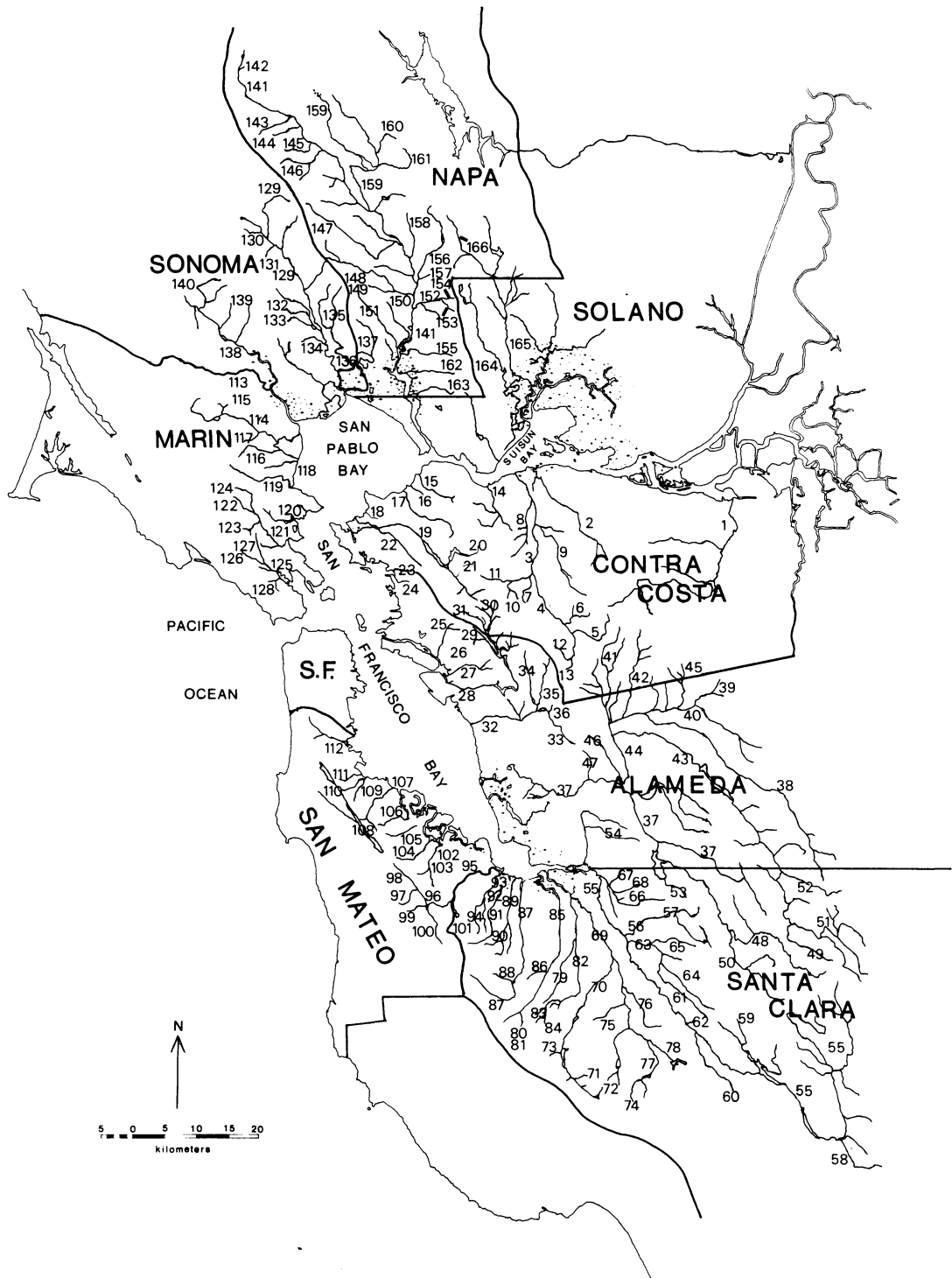
TABLE 1. CONTINUED

Novato Creek Drainage (114)	Napa River Drainage (141)
Bowman Canyon Creek (115)	Garnett Creek (142)
Arroyo Avichi Creek (116)	Ritchie Creek (143)
Warner Creek (117)	Mills Creek (144)
Arroyo San Jose Creek (118)	York Creek (145)
Pacheco Creek (119)	Sulphur Creek (146)
Miller Creek (120)	Dry Creek (147)
Corte Madera Creek Drainage (121)	Redwood Creek (148)
Fairfax Creek (122)	Brown Valley Creek (149)
Cascade Creek (123)	Napa Creek (150)
Sleepy Hollow Creek (124)	Carneros Creek (151)
Old Mill Creek Drainage (125)	Tulacay Creek (152)
Cascade Creek (126)	Spencer Creek (153)
Willow Reed Creek (127)	Murphy Creek (154)
Coyote Creek (128)	Suscol Creek (155)
Sonoma Creek Drainage (129)	Milliken Creek (156)
Yulupa Creek (130)	Sarco Creek (157)
Graham Creek (131)	Soda Creek (158)
Carriger Creek (132)	Conn Creek (159)
Felder Creek (133)	Chiles Creek (160)
Rodgers Creek (134)	Sage Creek (161)
Nathanson Creek (135)	Fagan Creek (162)
Schell Creek (136)	American Canyon Creek (163)
Huichica Creek (137)	Green Valley Creek (164)
Petaluma River Drainage (138)	Suisun Creek Drainage (165)
Lynch Creek (139)	Wooden Valley Creek (166)
Lichau Creek (140)	

*Streams were sampled during the survey.

†Numbers following names of streams correspond to stream locations in figure 1.

Fig. 1. General Map of the San Francisco Bay Drainage Basin. Numbers correspond to stream names presented in table 1.



METHODS

Sites were sampled for fish between 11 May and 10 October 1981. Representative riffle, glide, and pool habitats were sampled throughout the streams of the drainage basin.

Fish sampling was carried out with a 6-mm mesh seine 3 m in length, in combination with a portable Smith-Root Type V electroshocker at sites with depths to 1 m. At each site, repeated passes were made until most fish were captured. Sites with greater depths were sampled with 13- and 19-mm mesh gill nets, 2 m deep and 10 m to 20 m in length. Gill nets were set at sunset and retrieved at sunrise the following morning. A hand dip net was used to sample shallow intermittent pools. Stream sections were sampled above the influence of diel tidal fluctuations.

The number and size range of individuals of each species collected were recorded for each sampling locality. Most fish were released, although representative specimens were preserved in 10 percent formalin.

A scaled rating system, fashioned after Moyle and Nichols (1973), was used in assigning fish species an abundance rating for each collection site. Based on this scaled rating, (0) meant that no individuals of a particular species were observed; (1) that 1 to 3 individuals were present; (2) that 4 to 15 individuals were observed; (3) that the species was common, usually 15 to 50 individuals observed; (4) that the species was abundant, usually 50 to 100 individuals; and (5) that the species was extremely abundant, usually 100+ individuals. In addition, the percentage of each species comprising each sample was calculated from actual counts of fish per station.

Nineteen environmental variables were measured at each sampling site to determine whether species distributions were correlated with habitat characteristics. These included: (1) elevation; (2) mean depth; (3) maximum depth; (4) turbidity; (5) percentage of substrate silt, defined as particles less than .05 mm in diameter; (6) percentage of substrate sand, defined as particles between .05 mm and 2 mm in diameter; (7) percentage of the substrate gravel, defined as particles 2 mm to 10 mm in diameter; (8) percentage substrate cobbles, defined as particles 10 mm to 30 mm in diameter; (9) percentage substrate bedrock or boulders, defined as particles greater than 30 mm in diameter; (10) percentage of substrate rubble, defined as artificial fill, such as concrete, asphalt, bricks, and so on, usually greater than 30 mm in diameter; (11) percentage of the water surface shaded for the majority of the daylight period; (12) percentage of the area pools; (13) percentage of the area riffles; (14) percentage of the stream surface covered with floating aquatic vegetation; (15) percentage of the stream bottom covered with rooted aquatic vegetation; (16) quality and amount of cover available to fish; (17) percentage of stream channelized or leveed for flood control purposes; (18) degree of human disturbance; and (19) stream type. A qualitative rating system (0 to 5) was used to simplify the measuring of several environmental variables. For example, a turbidity rating of 0 is very clear, 5 extremely turbid. The quality and amount of cover available to fish is rated 0 for no cover and 5 for abundant and diverse cover. A human disturbance rating of 0 indicates no noticeable human disturbance, while 5 denotes significant alteration of the stream channel and riparian habitat. A scaled rating system (1 to 6) was used to describe stream type (cf. Moyle and Nichols 1973). A stream rated 1 is small, with intermittent flow during summer months; 2 is medium-sized, with intermittent flow during the summer months; 3 is large-sized, with intermittent flow during the summer months; 4 is small with permanent flow (1 to 10 l/sec); 5 is medium with permanent flow (10 to 20 l/sec) and 6 is large with permanent flow (20+ l/sec).

A Wilcoxon signed rank test was used to test for differences in the percentage of fish species co-occurrence of the 19 most abundant fish species (Sokal and Rohlf 1981). Linear regression analyses were computed between environmental variables and the percentage occurrence of the 19 most abundant fish species. A two-tailed Student's T test was used to determine whether correlation coefficients were statistically significant (Chiang and Selvin 1980).

Historical records on fish distribution and collections for streams in the San Francisco Bay drainage were examined from the following sources:

CAS	California Academy of Sciences, San Francisco;
CDFG	California Department of Fish and Game, Stream Survey Records (Menlo Park and Yountville offices);
CNHM	Chicago Natural History Museum (records provided by John D. Hopkirk);
SFSU	San Francisco State University (records provided by Margaret Bradbury);
SJSU	San Jose State University (records provided by Jerry J. Smith);
SNSU	Sonoma State University (records provided by John D. Hopkirk);
SSU	Sacramento State University (records provided by Martin R. Brittan);
SU	Stanford University (housed at California Academy of Sciences);
UCB	University of California, Berkeley (housed at California Academy of Sciences);
UCD	University of California, Davis (records provided by Peter B. Moyle);
UMMZ	University of Michigan Museum of Zoology (records provided by Robert R. Miller); and
USNM	United States National Museum.

Collection localities for this survey are mapped with historical distribution records for each species (figs. 2-36). Historical distribution data for the maps are based on these collections and records as well as published literature, California Department of Fish and Game Stream Survey files, and individual field notes.

Distributional records are presented in the Appendix and are organized by species. Scientific nomenclature follows Hubbs et al. (1979)⁴. Records for each species are arranged alphabetically by county and chronologically. Collecting locality is followed by date of collection, collector(s), source of information, and for museums, collection number, and number and size range of specimens, when available. Collections by the author and field assistants are abbreviated as follows: Robert A. Leidy and Peggy Lee Fiedler as L&F, and Robert A. Leidy and George R. Leidy as L&L. Accounts from the published literature are presented by author, year of publication, page number and, when available, number and size range of specimens. Numbers following distributional records correspond to numbered localities on the maps. Some previous distributional records are based entirely on observation and not on standard collection techniques. In these instances, the reference is preceded by an asterisk (*) and has not been included on a map.

⁴For three species the nomenclature of Hubbs et al. (1979) was not followed. Avise et al. (1975) demonstrated that *Lavinia exilicauda* and *Hesperoleucus symmetricus* belong in the same genus. The genus *Lavinia* takes precedence over *Hesperoleucus* (Girard 1854; Snyder 1913). *Menidia audens* has been superseded by *M. beryllina* and *Roccus saxatilis* by *Morone saxatilis* (American Fisheries Society 1980).

RESULTS AND DISCUSSION

Thirty-five species were collected from 376 sites in the San Francisco Bay drainage. Eighty-one sampling localities were without fish (table 2). Of the 35 species collected, 13 were native to California. Twenty-two species, or 63 percent of the total species collected, were introduced into California.

TABLE 2. STATUS OF NATIVE (N) AND INTRODUCED (I) FISHES KNOWN FROM STREAMS OF THE SAN FRANCISCO BAY DRAINAGE, CALIFORNIA

Species	Status*	First recorded from study streams	Source
PETROMYZONTIDAE			
<i>Lampetra tridentata</i>	N,O,?	Coyote Creek, 1905	Snyder (1905)
<i>L. ayresii</i>	N,O,?	Alameda Creek, 1966	Hopkirk (1973)
<i>L. pacifica</i>	N,O,?	Coyote Creek, 1923	Hubbs (1924)
ACIPENSERIDAE			
<i>Acipenser medirostris</i>	N,O,S	"Abundant in Bay and rivers and creeks flowing into it...", 1857	Girard (1857)
CLUPEIDAE			
<i>Dorosoma petenense</i>	I,O,P	Petaluma River, 1980	CDFG
<i>Alosa sapidissima</i>	I,O,P	Napa River, 1976	CDFG
SALMONIDAE			
<i>Oncorhynchus kisutch</i>	N,X	San Rafael Creek, 1926	SU 59662
<i>O. keta</i>	N,O,S	As "San Francisco"	Jordan and Jouy (1881) Jordan and Gilbert (1881)
<i>O. tshawytscha</i>	N,O,S	"Young taken at Mare Island," 1890	Eigenmann (1890)
<i>Salmo trutta</i>	I,X	Arroyo Honda Creek, 1940's	Skinner (1962)
<i>S. gairdnerii</i>	N,X	San Leandro Creek, 1855 "...back of Martinez toward the foot of Monte Diablo," 1855 [probably Walnut Creek drainage]	Gibbons (1855)
CYPRINIDAE			
<i>Cyprinus carpio</i>	I,X	Coyote Creek, 1944	CAS 18613
<i>Carassius auratus</i>	I,X	Stevens Creek, 1942	Shapovalov (1942)
<i>Notemigonus crysoleucas</i>	I,X	Temescal Creek, 1955	CAS (no number)
<i>Pimephales promelas</i>	I,X	Suisun Creek, 1963	John D. Hopkirk (pers. comm.)
<i>Pogonichthys macrolepidotus</i>	N,O,EX	Petaluma [River], 1855	UMMZ 56278
<i>Gila crassicauda</i>	N,O,EX	Coyote Creek, 1905	SU 21031
<i>Rhinichthys osculus</i>	N,O,EX	Santa Isabel [Isabel] Creek, 1898	SU 37823 and 16172
<i>Lavinia exilcauda</i>	N,X	Coyote Creek, 1897?	SU 4219
<i>Mylopharodon conocephalus</i>	N,O,?	Napa River, 1972	UCD
<i>Orthodon microlepidotus</i>	N,X	Coyote Creek, 1905	Snyder (1905)
<i>Ptychocheilus grandis</i>	N,X	Alameda Creek, 1898	CNHM 2574
<i>Lavinia symmetricus</i>	N,X	San Mateo Creek, 1857 and 1860	UMMZ 87106
CATOSTOMIDAE			
<i>Catostomus occidentalis</i>	N,X	San Francisco [Francisquito] Creek, 1890	SU 37015
ICTALURIDAE			
<i>Ictalurus catus</i>	I,X	Napa River, 1926	CAS, Acc. 1926
<i>I. melas</i>	I,X	Walnut Creek, 1980	Leidy (1983)
<i>I. nebulosus</i>	I,X	Coyote Creek, 1956	SJSU
<i>I. punctatus</i>	I,O,?	Coyote Creek, 1966	SJSU
CYPRINODONTIDAE			
<i>Lucania parva</i>	I,X	Corte Madera Creek, 1958	CAS 26357
POECILIIDAE			
<i>Gambusia affinis</i>	I,X	Coyote Creek, 1941	CAS 18610
ATHERINIDAE			
<i>Menidia beryllina</i>	I,X	Los Gatos Creek, 1968	SJSU

TABLE 2. CONTINUED

Species	Status*	First recorded from study streams	Source
GASTEROSTEIDAE			
<i>Gasterosteus aculeatus</i>	N,X	San Jose [Coyote Creek?], 1858 Adobe Creek, 1896-1898?	Girard (1859) SU 4444
COTTIDAE			
<i>Cottus asper</i>	N,X	Petaluma [River], 1855	UMMZ 171133
<i>C. gulosus</i>	N,X	San Mateo Creek, 1854	Girard (1854)
<i>C. aleuticus</i>	N,O,?	Conn Creek, 1945	CDFG
<i>Leptocottus armatus</i>	N,O,P	Tulacay Creek, 1960	CAS, Acc. 1962-VIII:13
PERCICHTHYIDAE			
<i>Morone saxatilis</i>	I,X	Napa River, 1927	CAS, Acc. 1927
CENTRARCHIDAE			
<i>Archoplites interruptus</i>	N,X	"Franciquita" [San Francisquito] Creek, 1860	UMMZ 87164
<i>Lepomis machrochirus</i>	I,X	Bear Creek, 1943	SU (no number)
<i>L. microlophus</i>	I,X	Walnut Creek, 1978	CDFG
<i>L. gibbosus</i>	I,X	Walnut Creek, 1980	Leidy (1983)
<i>L. cyanellus</i>	I,X	Suisun Creek, 1940	Shapovalov (1940)
<i>Pomoxis annularis</i>	I,X	Sage Creek, 1981	Leidy (present study)
<i>P. nigromaculatus</i>	I,X	Suisun Creek, 1940	UMMZ 131515
<i>Micropterus salmoides</i>	I,X	Coyote Creek, 1953	CDFG
<i>M. dolomieu</i>	I,X	Alameda and Napa creeks, 1874	Shebley (1917)
PERCIDAE			
<i>Percina macrolepida</i>	I,X	Arroyo Mocho Creek, 1981	Leidy (present study)
EMBIOTOCIDAE			
<i>Hysterocarpus traskii</i>	N,X	Coyote Creek, 1895	SU 5007
GOBIDAE			
<i>Eucyclobius newberryi</i>	N,O,EX	Novato Creek, 1945	CAS 12995
<i>Gillichthys mirabilis</i>	N,X	Plummer Creek, 1966	CAS, Acc. 1967-II
<i>Acanthogobius flavimanus</i>	I,X	Plummer Creek, 1966	CAS, Acc. 1967-III

*EX = extinct in study streams.

P = probably present in study streams.

S = occurs only occasionally as strays.

O = not collected during this study.

X = collected during this study.

? = present status unknown.

Sixteen species not collected during this study were recorded in previous collections: *Lampetra tridentata* (Gairdner), *L. ayresii* (Günther), *L. pacifica* Vladykov, *Acipenser medirostris* Ayres, *Dorosoma petenense* (Günther), *Alosa sapidissima* (Wilson), *Onchorhynchus keta* (Walbaum), *O. tshawytscha* (Walbaum), *Pogonichthys macrolepidotus* (Ayres), *Gila crassicauda* (Baird and Girard), *Rhinichthys osculus* (Girard), *Mylopharodon conocephalus* (Baird and Girard), *Ictalurus punctatus* (Rafinesque), *Cottus aleuticus* Gilbert, *Leptocottus armatus* Girard, and *Eucyclogobius newberryi* (Girard).

Habitats typical of *Lampetra* spp. were sampled, but *Lampetra* spp. are often quite difficult to collect (Leidy, personal observation). *Oncorhynchus*, with the exception of *O. kisutch*, spawns in the larger streams of the Sacramento-San Joaquin River system and are found in study streams only rarely as strays. *Cottus aleuticus* is found primarily in coastal streams draining directly into the Pacific Ocean. *Acipenser medirostris*, *Alosa sapidissima*, *Dorosoma petenense*, *Pogonichthys macrolepidotus*, and *Ictalurus punctatus* are found in slow-moving streams within the tidal zone, an area outside the sampling limits of this study. *Rhinichthys osculus* and *Mylopharodon conocephalus* occurred historically in the study streams, but are now likely extinct in these streams. *Gila crassicauda* is extinct (Mills and Mamika 1980).

***Lampetra tridentata* (Gairdner)**
Pacific lamprey (fig. 2)

Distributional records for this species exist for five streams within the study area: Coyote Creek, Alameda Creek, and the Napa River and two tributaries, Chiles Creek and Conn Creek. Snyder (1905) collected this lamprey from Coyote Creek and it was observed there as recently as 1978 (Jerry Smith, personal communication). In the Napa River drainage, Snyder (1908) recorded this species at Calistoga. A fish kill on the Napa River in 1979 revealed 35 individuals (CDFG stream survey records, 1979). W. I. Follett and G. M. Peckham of CAS recorded this lamprey several times during the 1950s in Alameda Creek. Aceituno et al. (1976) recently confirmed its presence in Alameda Creek.

***Lampetra ayresii* (Günther)**
River lamprey (fig. 2)

A single distributional record exists for Alameda Creek (Hopkirk 1973: 20). Jordan (1881) listed *Ammocoetes plumbeus* (= *Lampetra ayresii*) as occurring in coastal streams from San Francisco northward. It is probable that several recorded simply as "lamprey" by the California Department of Fish and Game for the Napa River drainage refer to this species. This species is present in the lower Sacramento-San Joaquin River system, but it is not abundant (Peter Moyle, personal communication).

***Lampetra pacifica* Vladykov**
Coastrange brook lamprey (fig. 2)

Hubbs (1924: 592) recorded "a few" ammocoetes of *Lampetra pacifica* from Coyote Creek while studying the life history of the Pacific lamprey. Because of the difficulty of collecting lampreys in general, *L. pacifica* is probably more common in streams tributary to San Francisco Bay than collection records indicate.

***Acipenser medirostris* Ayres**
Green sturgeon

Little information is available on the abundance of *Acipenser medirostris* in the lower Sacramento-San Joaquin River system where it is considered uncommon (Moyle 1976a). The few historical records of its occurrence in the study area indicate that it was occasionally found in San Francisco fish markets; however, Lockington (1879) noted that this species was "abundant in the [San Francisco] Bay and rivers and creeks flowing into it...."

***Dorosoma petenense* (Günther)**
Threadfin shad (fig. 3)

In 1980 *Dorosoma petenense* was recorded in a fish kill in the lower reaches of the Petaluma River, Sonoma County (CDFG stream survey records). *Dorosoma petenense* is

abundant in the Sacramento-San Joaquin River Delta and can be expected to occur in slow-moving backwaters near the mouth of streams entering the Delta. This shad has been recorded from several Bay drainage reservoirs and it is possible that it could escape into outlet streams (CDFG stream survey records).

***Alosa sapidissima* (Wilson)**
American shad (fig. 3)

Alosa sapidissima is known to occur in the lower Napa River, and in the Sacramento-San Joaquin River Delta.

***Oncorhynchus kisutch* (Walbaum)**
Silver salmon (fig. 4)

Oncorhynchus kisutch is now rare in the Sacramento-San Joaquin River system (Fry 1973). However, the older literature suggests that it may have been present in greater numbers in this river system in the past (Jordan and Gilbert 1881; Jordan and Jouy 1881; Eigenmann 1890). Skinner (1962) indicates there were spawning migrations of *O. kisutch* in most study streams with suitable habitat before human disturbance. The species was known to have occurred in Alameda Creek, in the late 1930s (John Hopkirk, personal communication). According to Willis Evans (letter to Paul Needham, February 21, 1957), San Pablo Creek formerly had spawning migrations of *O. kisutch*. It was also sighted during spawning migrations in streams of the Walnut Creek drainage during the 1950s to mid-1960s (Leidy 1983). Fry (1936) recorded the species in San Anselmo [= Corte Madera] Creek, and Hallock and Fry (1967) stated that perhaps there were spawning runs in both Corte Madera Creek and Arroyo Corte Madera del Presidio [= Mill Valley] Creek. During this study, several specimens were collected in the lowermost reaches of both Corte Madera and Old Mill [= Mill Valley] creeks.

***Oncorhynchus keta* (Walbaum)**
Chum salmon

Oncorhynchus keta is considered rare in the Sacramento River system (Hallock and Fry 1967). There are three records for San Francisco, although the specific collection localities are unknown (Jordan and Jouy 1881). It is likely that the species occurred in the study area only as strays in the lower reaches of larger streams.

***Oncorhynchus tshawytscha* (Walbaum)**
Chinook salmon

Oncorhynchus tshawytscha is abundant in the Sacramento River system but it may be considered rare in the study area streams (Hallock and Fry 1967). A single distributional record exists for "Young taken at Mare Island" (Eigenmann 1890).

Salmo trutta Linnaeus Brown trout (fig. 4)

Salmo trutta is an introduced salmonid which was represented in this survey by a single specimen collected in Ritchie Creek, Napa County. Skinner (1962: 135) reported that Arroyo Hondo Creek, Santa Clara County, had supported *S. trutta* populations until the late 1940s.

Salmo gairdnerii Richardson Rainbow trout (fig. 5)

Distribution. Gibbons (1855) first described *Salmo iridea* (= *irideus*, = *gairdnerii*) as nonsteelhead rainbow trout collected within the study area from San Leandro Creek, Alameda County. Ayres (1855: 36) ascribed *S. rivularis* to a form "distinct" from *S. irideus*, which he found "...back of Martinez toward the foot of Monte Diablo." It is probable that Ayres' reference refers to a stream within the Walnut Creek basin.

During the present study *S. gairdnerii* were collected in San Leandro Creek above San Leandro Reservoir and below Lake Chabot, Alameda and Contra Costa counties. It is unknown whether those collected during this survey below Lake Chabot were descendents from the original stock described by Gibbons, or whether they had hybridized with or been replaced by *S. gairdnerii* stocked in Chabot Reservoir. This species has not been introduced into San Leandro Reservoir and it is likely that those collected during this survey above the reservoir are descended from the original population described by Gibbons. None was collected during this survey in the Walnut Creek basin.

According to Willis Evans (letter to Paul R. Needham, February 21, 1957), San Pablo Creek, Contra Costa County, formerly contained spawning migrations of steelhead trout (*S. gairdnerii gairdnerii*). Needham and Gard (1959) reported native, self-perpetuating populations of *S. gairdnerii* in both the west and south branches of San Pablo Creek, apparently descended from steelhead stocks that became landlocked following construction of San Pablo Dam in 1918. *S. gairdnerii* was not collected during this survey in San Pablo Creek.

Snyder (1905) recorded *Salmo gairdnerii*/*S. g. gairdnerii* from San Francisquito, Madera [Corte Madera], San Antonio, Campbell [Los Gatos], Guadalupe, Coyote, Arroyo Honda [Hondo], Smith, and Isabel creeks, Santa Clara County. During the present study, this species was recorded in all but Coyote Creek. It is probable that all of these creeks supported resident and anadromous trout at one time. San Francisquito Creek and several of its tributaries, and possibly Stevens Creek, still maintain small runs of *S. g. gairdnerii*.

Resident and anadromous populations are fairly common in undisturbed, perennial streams of the Napa River and Sonoma Creek drainages. Several streams in Marin County also maintain small populations of these trout, most notably Corte Madera and Miller creeks and their tributaries.

Ecology. *Salmo gairdnerii* were collected in 20 percent of the samples, typically inhabiting the clear, shallow riffles in the middle and upper reaches (mean elevation 170 m) of relatively undisturbed, perennial stream sections (table 7). Substrates consisted primarily of sand, gravel, cobbles, and boulders. Although shading and cover were usually extensive, there was a notable lack of rooted and floating aquatic vegetation (table 7). Where collected, *S. gairdnerii* usually were the only species found and rarely were introduced species present (table 9). Where other species did occur, the native *Lavinia symmetricus* and *Gasterosteus aculeatus* were most commonly associated with *S. gairdnerii* (table 9).

Cyprinus carpio Linnaeus Carp (fig. 6)

Distribution. Distributional records for *Cyprinus carpio* are few, considering its successful introduction into a pond in Sonoma County in 1872, followed by its rapid spread throughout the state (Moyle 1976b). It was first collected by W. I. Follett and G. M. Peckham in Alameda Creek in 1955 and by W. I. Follett in lower Coyote Creek in 1944. It is, no doubt, locally common in disturbed lowland stream habitats throughout the San Francisco Bay drainage.

Ecology. During this study, *Cyprinus carpio* was found in only 3 percent of the samples. This omnivorous bottom feeder usually inhabited low elevation, channelized or highly disturbed stream sections, dwelling in warm, turbid pools, often with other exotic fishes (table 8). It was most abundant in silt-laden pools containing rubble, with moderate coverage of rooted and floating aquatic vegetation (table 8). *Cyprinus carpio* was associated with a variety of both introduced and native fishes. *Gambusia affinis* accounted for 40 percent of the individuals collected with it (table 9). In the sluggish, deep, low elevation pools *C. carpio* was commonly found with the native *Lavinia exilcauda* and introduced *Ictalurus melas* (table 9). At intermediate elevations, in intermittent pools, it was associated primarily with *L. symmetricus* and *Gasterosteus aculeatus*, but never in large numbers (table 9).

Carassius auratus (Linnaeus) Goldfish (fig. 7)

Distribution. The pet trade has facilitated the spread of *Carassius auratus*, especially in streams draining into south San Francisco Bay. This introduced minnow was collected in 4 percent of the samples, displaying habitat preferences similar to those of *Cyprinus carpio*.

Ecology. *Carassius auratus* was most abundant in the moderately shaded, deep, turbid pools with silt and rubble bottoms typical of many highly disturbed, low-elevation, permanent streams (table 8).

Immediately above the tidal zone of several streams, *C. auratus* was collected with large numbers of introduced *Lucania parva*. However, in the majority of the low elevation streams, *Gambusia affinis* was the most common associate of *C. auratus*, comprising about 32 percent of the individuals collected with it (table 9). In those low elevation streams with little turbidity, *Lavinia exilcauda*, *Gasterosteus aculeatus*, and *Catostomus occidentalis* were occasionally associated with *C. auratus*. In clear pools at intermediate elevations, *C. auratus* was found with large numbers of *Lavinia symmetricus*. *Lavinia symmetricus* comprised 35 percent of the individuals in collections where *C. auratus* occurred (see table 9). This species was never abundant in pools where densities of *L. symmetricus* were high. In highly disturbed pools, *C. auratus* was often the only species present, occurring as a few large adults commonly in lengths greater than 250 mm FL.

Notemigonus crysoleucas (Mitchill) Golden shiner (fig. 8)

Distribution. The earliest records indicate this introduced bait minnow, *Notemigonus crysoleucas* was first recorded in the Coyote Creek drainage in 1964 (SJSU, CD-24), and in the Napa River drainage in 1965 (CAS, Acc. 1966-VI: 20). Because this species is

the most common bait fish in California, it may be introduced repeatedly into streams by fishermen.

During this study, *N. crysoleucas* was collected in only 2 percent of the samples. Recently, the spread of this species has been facilitated through canals and aqueducts transporting water from the Central Valley drainage to Bay Area reservoirs, where it no doubt escaped into tributary streams.

Ecology. This species was collected in warm, clear, silt-bottomed pools, usually in the disturbed lower and middle reaches of unshaded streams, often in drainages containing large reservoirs (table 8).

This minnow was generally associated with a large number of fish species, but was never itself collected in large numbers. Moyle and Nichols (1973), in their study of central Sierran foothill fishes, attributed the low numbers of *N. crysoleucas* collected in samples to the ability of a few individual fish to escape from ponds and reservoirs, and to being released from bait buckets. In the large, clear, sluggish pools of low elevation streams it was most commonly associated with *Catostomus occidentalis*, *Lavinia exilcauda*, and *Gambusia affinis*, the latter two species comprising 64 percent of the individuals collected with it (table 9). Escaped *N. crysoleucas* collected above and below reservoirs and ponds were found primarily with *L. symmetricus*. In similar habitats where *L. symmetricus* were in low densities or absent, *Lepomis cyanellus* and occasionally *Lepomis macrochirus* were collected with it (table 9).

***Pimephales promelas* Rafinesque** **Fathead minnow (fig. 9)**

The introduction of *Pimephales promelas* in California near the Colorado River in 1950, and subsequent propagation for use as bait and forage by private breeders and the California Department of Fish and Game, have facilitated its rapid expansion throughout the state (Shapovalov 1959; Moyle 1976a). However, before 1963, no records existed of its occurrence in the San Francisco Bay drainage. In 1963 (John D. Hopkirk, personal communication) and 1972 (UCDPM, 72-12), it was collected from Suisun Creek, a tributary to Suisun Bay. It had spread to lower Coyote Creek by 1977 (SJSU, CD-33). Large numbers were again collected from two localities on Lower Coyote Creek during the present study. This introduced minnow can now be expected to occur in other Bay drainage streams in the near future.

Moyle (1976a) expressed concern that this species could replace the native *Lavinia symmetricus* in intermittent stream habitats where it co-occurs. A review of past distributional records for *L. symmetricus* indicates that this has indeed occurred in Lower Coyote Creek.

***Pogonichthys macrolepidotus* (Ayres)** **Sacramento splittail (fig. 10)**

Pogonichthys macrolepidotus prefers sluggish stretches of the lowermost reaches of the main rivers of the Sacramento-San Joaquin Delta where salinities are often high (Moyle 1976a). This minnow was not collected during the study and probably has never been common in the study area because of a lack of suitable habitat. Distributional records indicate that it is abundant in Suisun Marsh and near the mouth of the Napa River (Caywood 1974; Peter B. Moyle, personal communication). Several records exist for its appearance in

Coyote Creek until 1905, although it has not been collected in the drainage since. A single specimen was collected from the Petaluma River in 1855 (UMMZ 56278, 1: 118 mm). More recently, its presence has been confirmed near the mouth of that river (Caywood 1974).

Gila crassicauda (Baird and Girard) Thicktail chub

Gila crassicauda was once one of the more abundant cyprinids in the Central Valley subsystem (Moyle 1976a). The last known collection of this species from the Sacramento-San Joaquin Delta occurred in 1957, and it is now considered extinct (Mills and Mamika 1980). *Gila crassicauda* historically occurred in Coyote Creek. A single distribution record exists for San Francisco, although the specific collection locality is unknown.

Rhinichthys osculus (Girard) Speckled dace (fig. 11)

Historically, this species was restricted to Alameda Creek and Coyote Creek drainages in the study area. In 1898, Snyder (1905) collected *Rhinichthys osculus* from Arroyo Hondo Creek and Isabel Creek, two tributaries of Alameda Creek. The most recent record of its occurrence in Alameda Creek is that of a single specimen collected by Leo Shapovalov in 1938 (CAS, Acc. 1952-X: 30, 1).

Scoppettone and Smith (1978) indicated that dace persisted at two localities in Coyote Creek until 1977. Jerry Smith (personal communication), in several recent surveys in the Coyote Creek drainage, has failed to collect it and is of the opinion that it may now be extinct. Deterioration of water quality and the introduction of numerous exotic fishes have no doubt led to its decline in Coyote Creek.

Lavinia exilcauda Baird and Girard Hitch (fig. 12)

Distribution. In the Central Valley, *Lavinia exilcauda* are characteristic of warm, sluggish stretches of river backwaters, sloughs, and ponds (Moyle 1976a). In study area streams, it was locally common in the Walnut, Rodeo, San Leandro, Alameda, Marsh, and Coyote Creek drainages.

Ecology. *Lavinia exilcauda* were collected at 11 percent of the stations sampled, comprising approximately 40 percent of the fish in samples in which they occurred (table 9). This native cyprinid was most abundant in the unshaded, deep pools typical of the intermediate and lower reaches of the larger permanent streams (table 7). Many of these streams flow through heavily urbanized areas where there is extensive stream channel alteration. As a result, pools where *L. exilcauda* occurred were often highly disturbed environments characterized by turbid water, heavily silted substrates, and large numbers of introduced species, especially *Gambusia affinis*, *Lepomis cyanellus*, and *Micropterus salmoides* (tables 7 and 9). Native fishes most commonly collected with *L. exilcauda* at the lower elevations included *Gasterosteus aculeatus*, *Ptychocheilus grandis*, and *Catostomus occidentalis* (table 9). At intermediate elevations and in sluggish stretches of stream immediately above and below large reservoirs, *L. exilcauda* were occasionally collected with *L. symmetricus*.

***Mylopharodon conocephalus* (Baird and Girard)**
Hardhead (fig. 13)

Apparently, *Mylopharodon conocephalus* has always been rare in the study area for lack of suitable habitat, preferring the clear, deep pools of large Central Valley streams (Moyle 1976a). Early records indicate that it appeared rarely in San Francisco fish markets. It has been collected from a single locality in the Napa River, in 1972 (UCDPM, 72-24, 2), but none was collected there during this study. This species may have become extinct in this drainage during the severe drought of 1976-1977 when much of the river was dry (Peter Moyle, personal communication).

***Orthodon microlepidotus* (Ayres)**
Sacramento blackfish (fig. 13)

Orthodon microlepidotus was collected from 1 percent of the stations. This species is restricted to the Coyote, Alameda, and Walnut Creek drainages and is locally abundant in Coyote Creek. Neither Scopettone and Smith (1978) nor this survey recorded this species in Alameda Creek. It was last recorded in Alameda Creek in 1978 by the California Department of Fish and Game in two ponds confluent with Arroyo Valle Creek. It was collected at only two localities in the lower Walnut Creek drainage and can be considered uncommon there.

***Ptychocheilus grandis* (Ayres)**
Sacramento squawfish (fig. 14)

Distribution. This native, predaceous cyprinid was collected in 9 percent of the samples, usually in clear, shallow pools of permanent streams between the elevations of 2.5 m and 307 m (table 7).

Ecology. Although *Ptychocheilus grandis* preferred partially shaded, undisturbed pools with sand, gravel, cobble, or bedrock substrates, this species was occasionally common in turbid pools with heavily silted substrates typical of lower elevations of streams flowing through urbanized areas (table 7). At low elevations, *P. grandis* were primarily associated with *Lavinia exilcauda*, *Catostomus occidentalis*, *Gambusia affinis*, and occasionally *Menidia beryllina*. At intermediate elevations, it was commonly encountered with *L. symmetricus*, *Gasterosteus aculeatus*, and *Cottus asper* (table 9). *Ptychocheilus grandis* were rarely collected with most introduced species, particularly centrarchids (see table 9). As was found by Moyle and Nichols (1973) for central Sierran foothill streams, *P. grandis* were seldom found in large numbers where *L. symmetricus* and *Salmo gairdnerii* were abundant. Similarly, *Cottus gulosus* and *P. grandis* were collected together from only one locality.

***Lavinia symmetricus*⁵ (Baird and Girard)**
California roach (fig. 15)

Distribution. *Lavinia symmetricus* occurred in 37 percent of the samples and was extremely abundant where collected, averaging 60 percent of the fish in 142 collections in which it was found. Recent surveys have not, however, collected this species from lower

⁵For a discussion of the zoological nomenclature used here, see Methods.

Coyote Creek where historical records indicate that it was once common. Surprisingly, *L. symmetricus* has never been recorded from the Petaluma River drainage although suitable habitat exists there. During this survey, it was uncommon in the lower reaches of many of the larger streams and generally absent from stream sections containing other large piscine predators.

Ecology. *Lavinia symmetricus* was collected primarily in the clear, intermediate and headwater, intermittent stream reaches (mean elevation 115 m), in well-shaded pools with sand, gravel, and bedrock substrates (see table 7). Pools containing *L. symmetricus* often contained extensive mats of rooted and floating aquatic vegetation, especially filamentous algae and duckweed (*Lemna minor*; table 7). Although *L. symmetricus* often occurred in pools with heavy silt substrates, they were never abundant there when found.

Lavinia symmetricus were most commonly collected with native fishes such as *Gasterosteus aculeatus*, *Catostomus occidentalis*, *Ptychocheilus grandis*, and *Salmo gairdnerii* (table 9). *Lavinia symmetricus* were collected with introduced centrarchids only in large pools along permanent reaches of stream. In the smaller, warm, intermittent pools characteristic of intermediate and headwater streams, *L. symmetricus* were collected in large numbers and at extremely high densities, where large predatory fish were absent. This result is similar to conditions observed by Moyle and Nichols (1973) for this species when found in intermittent streams in the central Sierra Nevada foothills. In isolated pools where introduced centrarchids were found in high densities, *L. symmetricus* were usually absent. However, they were frequently collected in headwater streams below farm ponds with *Gambusia affinis*.

The ability of *L. symmetricus* to survive under stressful conditions of high water temperatures and low dissolved oxygen concentrations typical of drying pools within the study area has allowed it to successfully exploit habitats with conditions that other native species are unable to tolerate. The annual loss of *L. symmetricus* biomass in many desiccating pools, as conditions become too stressful for survival, can be of a high magnitude.

***Catostomus occidentalis* Ayres** **Sacramento sucker (fig. 16)**

Distribution. *Catostomus occidentalis* was locally common in the study area, occurring in 18 percent of the samples. This species was recorded in a wide variety of habitats, from deep, turbid pools of disturbed lower elevation stream sections (2 m elevation), to clear, relatively undisturbed headwater streams (893 m elevation).

Ecology. Most individuals of *C. occidentalis* greater than 200 mm FL were restricted in distribution to the deeper, silt-laden pools of intermediate and lower elevation stream sections (table 7). Juveniles, generally less than 100 mm FL, were often abundant in moderately shaded, clear, shallow pools with sand and gravel substrates, typical of headwater streams. These streams serve as nursery habitat for juvenile *C. occidentalis* (Moyle and Nichols 1973). Along the willow-choked banks of many deep intermittent pools of intermediate elevation streams, large (> 200 mm FL) adult *C. occidentalis* were often the only fish collected.

Catostomus occidentalis comprised approximately 22 percent of the fish from 87 samples in which they occurred, while its closest associates, *Lavinia symmetricus* and *Gasterosteus aculeatus*, accounted for over 60 percent of the remaining individuals in these samples (table 9). Introduced species accounted for only 10 percent of the individuals collected with *C. occidentalis*, with *Gambusia affinis* accounting for over half of these individuals (table 9).

***Ictalurus catus* (Linnaeus)**
White catfish (fig. 17)

Ictalurus catus are common in the sluggish backwaters and sloughs in the Sacramento-San Joaquin Delta, and in several Bay Area reservoirs (CDFG stream survey records). During this study, the species was collected from a single locality in lower Walnut Creek, Contra Costa County. Distributional records indicate that it is common in the sluggish, lower reaches of the Napa River. W. I. Follett and G. M. Peckham recorded the species in 1955 in Alameda Creek below Niles. It also occurs within the Alameda Creek drainage in two ponds which have confluence with Arroyo Valle Creek. Jerry Smith (personal communication) recorded this species in the lower reaches of the Guadalupe River, Santa Clara County.

***Ictalurus melas* (Refinesque)**
Black bullhead (fig. 18)

Distribution. Although considered uncommon both throughout California and in the study area, this introduced omnivorous bottom feeder was the most abundant ictalurid collected, occurring in 2 percent of the samples. *Ictalurus melas* was especially common in large, turbid, deep pools in Walnut and San Ramon creeks. It was collected in large numbers in Sage Creek, immediately upstream from Conn Reservoir. A single specimen was collected in Alameda Creek opposite Sunol Regional Wilderness headquarters. No historical distribution records exist for this species in streams tributary to San Francisco Bay, although it is locally common in the Sacramento-San Joaquin Delta (Moyle 1976a).

Ecology. Large adults, greater than 200 mm FL, preferred the deep, turbid, silt-bottomed, intermittent pools along well-shaded, moderately disturbed stream sections at intermediate elevations (table 8). Juveniles, usually less than 100 mm FL, were collected in clear, shallow pools among stream-side masses of rooted and floating aquatic vegetation, and in warm, shallow pools immediately above large reservoirs.

Ictalurus melas accounted for 31 percent of the individuals in samples in which they occurred (see table 9). Interestingly, *Lavinia symmetricus*, *L. exilicauda*, and *Catostomus occidentalis* were its most common associates, collectively comprising 52 percent of the individuals collected with *I. melas* (table 9). The only introduced species collected in any significant numbers with *I. melas* were the predaceous *Lepomis cyanellus* and *Gambusia affinis* (table 9).

***Ictalurus nebulosus* (Lesueur)**
Brown bullhead (fig. 19)

This catfish is one of the most common gamefishes in the Sacramento-San Joaquin Delta (Moyle 1976a). Surprisingly, it was recorded in only 1 percent of the samples, usually in warm, turbid pools in the middle reaches of the larger streams. Historical records indicate that it was widespread in the study area where suitable habitat existed.

***Ictalurus punctatus* (Rafinesque)**
Channel catfish

A single distributional record exists for *Ictalurus punctatus* from Coyote Creek. This species is probably rare in the study area for lack of suitable habitat.

***Lucania parva* (Baird and Girard)** **Rainwater killifish (fig. 20)**

Distribution. This introduced cyprinodont was collected in 5 percent of the samples. *Lucania parva* was established accidentally in streams tributary to San Francisco Bay during the mid- to late-1950s from eggs imported with oysters for culture from the eastern United States (Hubbs and Miller 1965). The species was first recorded in the study area from Corte Madera Creek in 1958 (CAS 26357, 4) and has since become established in great numbers in the lower elevations of many streams, especially those draining into south San Francisco Bay.

Ecology. *Lucania parva* was collected in warm, turbid pools between the elevations of 1 m and 13 m, and was found in highest concentrations in the brackish water along the freshwater/tidal interface. In California, this species is known to occur in both brackish and freshwater habitats, and there is some evidence to suggest it migrates into fresh water from brackish water to breed (Moyle 1976a). These habitats were typically channelized and unshaded, with heavily silted substrates and moderate cover in the form of rooted and floating aquatic vegetation (table 8).

Lucania parva was found with few species, especially native fishes. Its most common associate was *Gambusia affinis* and together the two species accounted for about 70 percent of the individuals collected (table 9). The only native fishes collected in significant numbers with *L. parva* were *Lavinia exilcauda* and *Gasterosteus aculeatus*. *Gasterosteus a. trachurus* comprised 23 percent of the individuals collected with *Lucania parva*.

***Gambusia affinis* (Baird and Girard)** **Mosquitofish (fig. 21)**

Distribution. *Gambusia affinis* occurred in 27 percent of the samples between the elevations of 1 m and 859 m. Historical records show that it occurred in Coyote Creek by 1941 (CAS 18610, 20), Walnut Creek by 1942 (SU 40832, 9), and Marsh and San Ramon creeks by 1945 (CAS 17932, 15; CAS 19904, 25). Since these introductions, this species has spread into streams throughout the San Francisco Bay drainage.

Ecology. Although most common in the channelized lower reaches of streams, *G. affinis* was locally abundant in headwater streams below farm ponds and irrigation ditches. It preferred warm, turbid, heavily silted pools, often containing rubble with moderate amounts of floating and rooted aquatic vegetation (table 8). These highly disturbed intermittent stream habitats usually contained few additional species.

Gambusia affinis accounted for about 63 percent of the individuals in samples where it was found (table 9). In highly disturbed environments it was often the only fish collected, occurring in schools containing as many as 5,000 individuals. Surprisingly, introduced fishes, especially large predaceous centrarchids, were never abundant where *G. affinis* occurred in large numbers. Rather, *Gasterosteus aculeatus* and *Lavinia exilcauda* were its most common associates at lower elevations, while *L. symmetricus* was often found with it in large numbers in headwater streams near farm ponds and drainage ditches (table 9).

***Menidia beryllina* Hay** **Inland silverside (fig. 22)**

Distribution. This atherinid was introduced by the California Department of Fish and

Game in 1968 on an experimental basis, into Del Valle Reservoir, Alameda County, and into Anderson and Lexington reservoirs, Santa Clara County. It now occurs below Del Valle Reservoir in two ponds confluent with Arroyo Valle Creek (CDFG stream survey files) and in Alameda Creek, near Sunol. It has also been recorded below Lexington Reservoir in Los Gatos Creek.

Menidia beryllina has become established in the lower reaches in several North Bay streams flowing into San Pablo and Suisun bays. These include the Petaluma River and Pinole, Arroyo Hambre, Walnut, and Green Valley creeks. It is also abundant in Suisun Marsh (Peter Moyle, personal communication). Expansion of *M. beryllina* populations in the Delta and the lowermost reaches of study streams can be expected to continue.

Ecology. This species prefers the deep, clear pools of permanent streams at lower elevations (mean elevation 21 m), with silt, sand, and gravel substrates (table 8). These pools are usually in disturbed, often channelized stream sections with little shading (table 8).

Menidia beryllina was abundant where found, comprising 34 percent of the individuals in collections in which it occurred (table 9). At low elevations, it was associated primarily with *Lavinia exilicauda*, *Gasterosteus aculeatus*, *Gambusia affinis*, and, occasionally, with *Acanthogobius flavimanus* (table 9). Above and below reservoirs it was most often collected with *Lavinia symmetricus* and *Ptychocheilus grandis* (table 9). Although occasionally collected in pools with large introduced centrarchids, *M. beryllina* was most abundant where these piscine predators were few.

Gasterosteus aculeatus Linnaeus Threespine stickleback (fig. 23)

Distribution. *Gasterosteus aculeatus* was the most common species found in the study area, occurring in 43 percent of the samples from 0 to 123 m elevation. Both the anadromous form, *G. a. aculeatus*, and the fully freshwater form, *G. a. microcephalus*, were encountered in large numbers during this study. The anadromous form was abundant in the clear, shallow pools, with sand and gravel substrates, in reaches of stream immediately above the freshwater/tidal interface. The freshwater form was often encountered throughout the stream's length, in habitat conditions similar to those found with the anadromous form, but were especially abundant in the undisturbed, gravel-bottomed pools typical of many headwater stream habitats.

Ecology. Both forms were associated with dense mats of floating and rooted aquatic vegetation which provided extensive cover (table 7). Male *Gasterosteus aculeatus* in breeding coloration were found in large numbers within these masses of aquatic vegetation. The wide distribution of *G. aculeatus* is due in part to their ability to maintain populations in moderately disturbed environments typical of the urbanized sections of many streams flowing into San Francisco Bay. However, in heavily silted pools with moderate to high turbidities, they were uncommon.

Gasterosteus aculeatus comprised about 63 percent of the individuals in the 166 samples in which they occurred (table 9). Its most common associates in the intermediate and headwater stream sections were *Lavinia symmetricus* and *Cottus asper*, while at lower elevations near the freshwater/tidal interface, it was primarily collected with *Gambusia affinis* (table 9). For the most part, it was uncommon where introduced species were abundant, especially the larger predaceous centrarchids (table 9).

Cottus asper Richardson Prickly sculpin (fig. 24)

Distribution. *Cottus asper* occurred in 9 percent of the samples. Unlike *C. gulosus*, *C. asper* was collected in a wide variety of habitats, from turbid pools in highly disturbed, channelized stream sections to clear headwater streams, between the elevations of 1 m and 320 m.

Ecology. In undisturbed headwaters this cottid was associated with *Lavinia symmetricus* in clear, shaded pools with sand and gravel substrates. In these areas, *C. asper* was often collected under cut banks where extensive willow root mats provided cover (tables 7 and 9). At intermediate and lower elevations *C. asper* was found in both clear and turbid pools, with silt substrates, containing extensive surface coverage of floating and rooted aquatic vegetation (e.g., watercress *Rorippa nasturtium-aquaticum*, water fern *Azolla filiculoides* [table 7]). Large numbers of *Gasterosteus aculeatus* and *L. symmetricus* were commonly associated with *C. asper* in intermediate and lower stream reaches (table 9). During this study, *C. asper* was collected together with *C. gulosus* at intermediate elevations in Coyote Creek above Coyote Reservoir; Guadalupe Creek below Guadalupe Reservoir; San Leandro Creek below Lake Chabot; and in upper Sonoma Creek. *Cottus asper*, unlike *C. gulosus*, was found in disturbed stream habitats.

Although some populations of *C. asper* appear to be adaptable to human-caused changes in physical stream environments (e.g., channelization, siltation), the effects of introduced fishes on this species are not clear. *Cottus asper* was occasionally collected with large numbers of introduced species, such as *Gambusia affinis* and *Menidia beryllina*. However, it was usually absent where other large introduced piscine predators were found, such as *Micropterus salmoides*, *Lepomis cyanellus*, *L. macrochirus*, and *Ictalurus melas*, indicating that it is unable to coexist with these species (table 9).

Cottus gulosus (Girard) Riffle sculpin (fig. 25)

Distribution. Girard (1854) first described *Cottopsis gulosus* (= *Cottus gulosus*) within the study area from San Mateo Creek, San Mateo County. This species has not been collected from San Mateo Creek since Girard's original description and is probably extinct within the drainage below Crystal Springs Reservoir. It was locally abundant in the upper reaches of the Guadalupe River drainage, San Leandro Creek above San Leandro Reservoir, upper Sonoma Creek, and Conn Creek above Lake Hennessey.

Ecology. *Cottus gulosus* occurred in 7 percent of the samples, demonstrating habitat preferences very similar to those of *Salmo gairdnerii*. Where present, this cottid was usually collected in large numbers. *Cottus gulosus* preferred the heavily shaded, undisturbed middle to headwater reaches of streams with low turbidity and silt with sand and gravel substrates (see table 7). This cottid was found to be highly sensitive to human-caused disturbances of the stream environment, occurring almost exclusively in unaltered stream channels without introduced species (tables 7 and 9). During this study, *C. gulosus* was collected only once with an introduced species. It was most often associated with *S. gairdnerii* and *Lavinia symmetricus* (table 9).

***Cottus aleuticus* Gilbert**
Coastrange sculpin (fig. 26)

Distributional records for *Cottus aleuticus* in streams flowing into San Francisco Bay are questionable and may be based on misidentification. Two juveniles collected on Conn Creek were identified as this species by L. Shapovalov in 1945 (California Department of Fish and Game stream survey files). This species was recorded in a fish kill on the lower Petaluma River in 1980 (California Department of Fish and Game stream survey files).

***Leptocottus armatus* Girard**
Pacific staghorn sculpin (fig. 26)

Typically a marine cottid, *Leptocottus armatus* often spends the juvenile stage of its life in freshwater (Moyle 1976a). No specimens were recorded during this survey. This cottid has been collected from Corte Madera Creek and the lower Napa River. It is locally common, no doubt, in the tidal zone near the mouth of other Bay streams.

***Morone saxatilis* (Walbaum)**
Striped bass (fig. 27)

Morone saxatilis was introduced into California in 1879 when about 135 individuals were released in Carquinez Strait (Sacramento-San Joaquin Delta) at Martinez (Moyle 1976b). During this study, *M. saxatilis* was recorded in the lower sections of three North Bay streams between the elevations of 1 m and 2 m. All individuals collected during this study were juveniles indicating that the lower reaches of the streams serve as nursery areas. Historical records show that this species also occurs at the mouth of the Petaluma River and in the lower Napa River.

***Archoplites interruptus* (Girard)**
Sacramento perch (fig. 28)

This native centrarchid was represented by a single specimen collected during this survey from Alameda Creek. Aceituno et al. (1976) contended that *Archoplites interruptus* was not native to the Alameda Creek drainage, but was introduced to it following the construction of Calaveras Reservoir in 1924. The fact that *A. interruptus* was first collected from Alameda Creek in 1953 tends to support this contention. A single specimen was collected in 1860 in Francisquita [San Francisquito] Creek by Alexander Agassiz (UMMZ 87164). The species was first recorded in Coyote Creek by Carl L. Hubbs in 1922 (UMMZ 63335 and 63336), then by William I. Follett in 1932 (CAS). The last record of this species from Coyote Creek is for 1959 (SJSU, CD-16). The apparent elimination of *A. interruptus* from the Coyote Creek drainage is probably due to competition with non-native centrarchids. This species also occurs in Lake Anza, Alameda County, where it was introduced in the early 1950s.

***Lepomis macrochirus* Rafinesque**
Bluegill sunfish (fig. 29)

This introduced centrarchid was collected from only 2 percent of the samples. Although uncommon in the study area, *Lepomis macrochirus* was most abundant at intermediate elevations in the warm, deep, turbid pools of intermittent streams below reservoirs or farm ponds (table 8). It was common in larger streams draining into south San Francisco Bay, most notably Coyote and Saratoga creeks. These disturbed pools contained heavily silted or bedrock substrates and were moderately shaded (table 8).

There were typically a large number of other fish species where *L. macrochirus* was abundant. *L. macrochirus* comprised about 18 percent of the individuals in samples in which it occurred (table 9). Those species most commonly associated with *L. macrochirus* include *Gasterosteus aculeatus*, *Lavinia exilcauda*, *Lavinia symmetricus*, and *Gambusia affinis* (table 9). In several pools large numbers of adult *Lepomis macrochirus* were the only fish present.

***Lepomis microlophus* (Günther)**
Redear sunfish (fig. 30)

This introduced centrarchid was uncommon in the study area, occurring in only four samples. *Lepomis microlophus* prefers deep, warm pools of larger streams and quiet backwaters with dense aquatic vegetation, which are characteristic of habitats not often encountered within the study area (Moyle 1976a).

***Lepomis gibbosus* (Linnaeus)**
Pumpkinseed sunfish (fig. 30)

Lepomis gibbosus is known from only two stream localities in the San Francisco Bay drainage. During this study, three individuals were collected from a pool in lower San Ramon Creek. In 1981, eight young-of-the-year were collected from lower Guadalupe Creek (Jerry Smith, personal communication). This species was once known to occur in Golden Gate Park, San Francisco (Leidy 1983).

***Lepomis cyanellus* Rafinesque**
Green sunfish (fig. 31)

Distribution. *Lepomis cyanellus* was the most widely distributed centrarchid in this study area, occurring in 9 percent of the samples. Shapovalov (1940) recorded this species in Suisun Creek immediately below Lake Curry. By 1945 it had appeared in lower San Ramon Creek (CAS 19909) and its presence was confirmed in the San Francisquito Creek drainage by 1956 (SJSU, SF-1). Today it is common in many streams flowing into San Francisco Bay.

Ecology. This introduced centrarchid prefers the warm, deep, moderately disturbed pools of low and intermediate elevation intermittent streams, usually with silt, sand, and occasionally bedrock substrates (table 8). These pools were well shaded with extensive coverage of floating and rooted aquatic vegetation (table 8).

Moyle and Nichols (1973, 1974) found that where *Lepomis cyanellus* occurred in intermittent streams, *Lavinia symmetricus* was usually absent. Predation by *Lepomis cyanellus* apparently eliminated populations of *Lavinia symmetricus* where the two species occurred together in intermittent pools. Similarly, during this study, *Lavinia symmetricus* and *Lepomis cyanellus* were usually not collected together from small, intermittent pools. In many of these pools, *Lepomis cyanellus* was the only species collected, often occurring as a few large adults. However, in the larger pools of permanent streams where there was abundant aquatic vegetation, large numbers of *Lavinia symmetricus* were regularly collected with *Lepomis cyanellus*.

At intermediate elevations, *Lepomis cyanellus* was most commonly associated with *Gambusia affinis* and *Gasterosteus aculeatus*, and with *Lavinia exilcauda* and *Catostomus occidentalis* in the deeper pools typical of lower elevations (see table 9). In general, other large introduced piscine predators were absent where *Lepomis cyanellus* was abundant.

***Pomoxis annularis* Rafinesque** **White crappie (fig. 32)**

Pomoxis annularis was collected from a single locality in Sage Creek immediately above Lake Hennessey, Napa County.

***Pomoxis nigromaculatus* (Lesueur)** **Black crappie (fig. 32)**

Pomoxis nigromaculatus was collected from nine localities. Both *P. nigromaculatus* and *P. annularis* are primarily reservoir species. They have become established in the warm pools of streams above and below large impoundments from which they have escaped.

***Micropterus salmoides* (Lacepède)** **Largemouth bass (fig. 33)**

Distribution. This large introduced piscine predator occurred in 5 percent of the samples, exhibiting habitat preferences similar to those of *Lepomis cyanellus*. *Micropterus salmoides* was common in several large South Bay streams, including upper San Leandro, San Lorenzo, Alameda, Coyote, and Guadalupe Creek drainages.

Ecology. *Micropterus salmoides* was most abundant in warm, deep, turbid pools with silt substrates at intermediate elevations (table 8). It was often found in large numbers in pools immediately above and below large reservoirs and farm ponds. These pools were usually moderately disturbed and well shaded, containing extensive growth of aquatic vegetation (table 8).

Micropterus salmoides accounted for about 27 percent of the individuals in samples in which it occurred, as it was usually found with a large number of other species (see table 9). It was collected most frequently with *Gasterosteus aculeatus* and *Gambusia affinis* (see

table 9). Interestingly, the diversity of native fishes associated with *M. salmoides* was likely to be greater than that of introduced species at any one sampling location. At low elevations it was commonly collected with large numbers of *Lavinia exilicauda*, while at intermediate elevations it was often collected with *L. symmetricus*.

***Micropterus dolomieu* Lacepède**
Smallmouth bass (fig. 33)

Micropterus dolomieu were first introduced into Napa and Alameda creeks, in 1874 (Shebley 1917), and are now established in streams of the Napa River drainage. Historical records for Alameda Creek indicate that *M. dolomieu* has not been collected in this drainage following its first introduction until this study. It is doubtful that the single individual collected in Alameda Creek during this study is descended from the original introduction in 1874. Rather, it probably escaped from one of the larger reservoirs in the Alameda Creek drainage.

***Percina macrolepida* Stevenson**
Bigscale logperch (fig. 34)

This percid was first recorded in the study area from Del Valle Reservoir, Alameda, and Santa Clara counties (Department of Water Resources 1974). During this study, a single specimen was collected from Arroyo Mocho Creek, near a point where water is released into the creek from the South Bay aqueduct. The spread of *Percina macrolepida* into the Alameda Creek drainage is the result of interbasin water transfers from the Central Valley and this species can now be expected throughout the drainage.

***Hysterocarpus traskii* Gibbons**
Tule perch (fig. 35)

Historical records indicate that *Hysterocarpus traskii* were never widespread in San Francisco Bay drainage streams. During this study, it was recorded from two localities on lower Green Valley Creek, Solano County, and a single specimen was collected from Alameda Creek near Sunol. In 1977, Jerry Smith (personal communication) found it to be abundant in Alameda Creek near Niles. The last record for *H. traskii* in Coyote Creek was for 1925 (SJSU, SD-21), and it is likely that it is now extinct in the drainage. Hopkirk (1973) made numerous collections of *H. traskii* during the late 1950s to mid-1960s in the lower Napa River drainage. Although no recent collections of this species exist for the drainage, it is probable that populations still persist in tidal marshes of the lower Napa and Petaluma rivers (J. D. Hopkirk, personal communication). This species is known to be abundant in Suisun Marsh and elsewhere in the Sacramento-San Joaquin estuary (Moyle 1976a).

***Eucyclogobius newberryi* (Girard)**
Tidewater goby (fig. 36)

No specimens of *Eucyclogobius newberryi* were recorded during this survey. This species

was collected in Lower Novato Creek in 1945 (CAS 12995), Berkeley Aquatic Park in 1950 (CAS, Acc. 1964-XI: 13: 1), and from the mouth of Corte Madera Creek, in 1958 (CAS, Acc. 1958-VIII: 9: 1). It is probably extinct in these localities although a few might still persist in Novato Creek (Camm Swift, personal communication).

Eucyclogobius newberryi prefers low salinity habitats near the mouths of streams. Channelization of the lower reaches of streams, deterioration of water quality, and competition from introduced gobiids have all probably had an adverse effect on *E. newberryi* populations in the study area.

Gillichthys mirabilis Cooper Longjaw mudsucker (fig. 36)

During this study this native goby was collected from a single location in Garrity Creek, Contra Costa County. Historical records show that *Gillichthys mirabilis* was recorded from Corte Madera Creek as early as 1959 (CAS 26360), and from Plummer Creek, a tidal slough, in 1966 (CAS, Acc. 1967-II: 2).

Acanthogobius flavimanus (Temminck and Schlegel) Yellowfin goby (fig. 36)

Distribution. This exotic goby was first recorded from the Sacramento-San Joaquin Delta in 1963, where it is now considered common (Brittan et al. 1963, 1970; Moyle 1976a). *Acanthogobius flavimanus* spread to Palo Alto Yacht Harbor and Leslie Salt Ponds (Alviso), south San Francisco Bay, by December of 1964 (Brittan et al. 1970: 209).

During this survey it was collected near the mouth of four North Bay streams flowing into San Pablo and Suisun bays, and from a single location in a stream entering south San Francisco Bay. This gobiid is common in the lowermost reaches of streams entering San Francisco Bay.

Ecology. *Acanthogobius flavimanus* is primarily an estuarine fish, preferring warm, shallow, littoral habitats in fresh, brackish, and salt water (Moyle 1976a). During this study, it was collected in 2 percent of the samples, almost exclusively in brackish water habitats immediately above the freshwater/tidal interface. It was found in highly disturbed, usually channelized stream sections in turbid pools with silt and sand substrates (table 8). These pools were poorly shaded, containing little cover in the form of aquatic vegetation (table 8).

Acanthogobius flavimanus accounted for about 18 percent of the individuals collected in samples in which it occurred (table 9). It was most abundant in the cover of undercut banks. With the exception of *Gasterosteus aculeatus aculeatus* and occasionally *Lavinia exilicauda*, native species were extremely uncommon where *A. flavimanus* was abundant (table 9). *Menidia beryllina* and *Lucania parva* were the most common introduced fishes associated with it (table 9). *Acanthogobius flavimanus*, *G. aculeatus*, and *M. beryllina* were all extremely abundant where they occurred together.

Species Distribution

Much of the San Francisco Bay drainage is urbanized. Urbanization has resulted in the alteration and destruction of stream habitats within the basin, especially at lower elevations surrounding the Bay shoreline. Among adverse impacts associated with urbanization are channel modification, elimination of riparian vegetation, creation of barriers to fish migration, reduced flows, and deterioration of water quality. Erosion and siltation, surface runoff of effluents and chemicals, and high water temperatures are associated with vegetation removal and water extraction. Erosion and siltation, and vegetation removal were also associated with agricultural practices and livestock grazing. Alteration and destruction of aquatic habitats, considered with competition and predation from introduced fishes, have resulted in the decline of native fish associations in several streams within the study area. Aceituno et al. (1976) and Scopettone and Smith (1978) documented declines in the native fishes occurring in Coyote and Alameda creeks, and attributed the deteriorating environmental conditions in the streams to human activities. Leidy (1983) attributed the decline of salmonids in streams of the Walnut Creek drainage basin to the channelization and deterioration of water quality.

A comparison of historical distribution records with recent collections shows a change in San Francisco Bay fish assemblages from dominance by native to dominance by introduced fishes. Changes in fish assemblages are best exemplified by comparison of collections made from three of the larger south San Francisco Bay study streams: Guadalupe River, San Francisquito Creek, and Alameda Creek.

After 1953, there was a dramatic increase in the number of introduced species occurring in the Guadalupe River drainage (table 3). This increase corresponded with extensive urbanization of the drainage during the 1950s. Replacement of native by introduced species occurred primarily in the lower- and middle-elevation stream sections that were disturbed by man's activities. In undisturbed intermediate and headwater stream sections, native fish assemblages remained essentially unchanged from those encountered by Snyder in 1905 and Hubbs in 1922. *Ptychocheilus grandis* appears never to have been common in the drainage. *Gasterosteus aculeatus*, although not collected during this survey, probably still occurs in the drainage. In many intermediate stream sections, especially below Guadalupe Reservoir, native and introduced species were collected together.

Table 4 shows that in the San Francisquito Creek drainage native fish assemblages remained intact essentially until the mid-1950s, when introduced species began to appear in collections. This again corresponds with urbanization of the drainage. *Ptychocheilus grandis* and *Archoplites interruptus* appear never to have been common in the drainage.

Introduced species began to appear in the Alameda Creek drainage in collections beginning in 1953 (table 5). Again, introduced fishes have largely replaced native species in altered stream habitats. Native fishes such as *Hysterocarpus traskii* and *Archoplites interruptus* persist in small numbers. *Rhinichthys osculus* and *Cottus gulosus*, recorded only once in the drainage, probably never occurred there in large numbers and are now apparently extinct.

Several species that historically occurred in study area streams are now either extinct within the drainage basin or their ranges have been severely reduced. Four native species, *Rhinichthys osculus*, *Eucyclogobius newberryi*, *Pogonichthys macrolepidotus*, and *Gila crassicauda* are apparently extinct in study area streams in which they historically occurred.

Rhinichthys osculus historically was found in the Alameda and Coyote Creek drainages. It occurred in Coyote Creek until 1977 when an extensive drought, combined with dete-

riorating water quality and competition from introduced fishes, eliminated this species (Jerry Smith, personal communication). *Eucyclogobius newberryi*, collected in the lower reaches of Novato Creek in 1945 and Corte Madera Creek in 1961, is apparently extinct in study area streams, although a few may still persist in Novato Creek (Camm Swift, personal communication). Channelization, deterioration of water quality, and competition from introduced gobiids have eliminated *E. newberryi* from these streams. *Pogonichthys macrolepidotus* was never common in study streams because of lack of suitable habitat. It is now extinct in Coyote Creek, the only known locality for this species in south San Francisco Bay. It is locally common in the Sacramento-San Joaquin River Delta and is known to occur in the tidal marshes of the lower Napa and Petaluma rivers. *Gila crassicauda* was last collected in the Sacramento-San Joaquin River Delta in 1957 and is now considered extinct (Mills and Mamika 1980).

Four native species, *Oncorhynchus kisutch*, *Mylopharodon conocephalus*, *Hysterothorax traskii*, and *Archoplites interruptus* exhibited extremely limited distributions within the study streams. *Oncorhynchus kisutch* was apparently more abundant in streams of the San Francisco Bay drainage than collection records indicate (John D. Hopkirk, personal communication; Skinner 1962). Channelization, creation of barriers to migration, and deterioration of water quality (e.g., siltation and high water temperatures) have all contributed to its decline in the study area. Today, small spawning migrations are known to occur in Corte Madera and Mill Valley creeks, two streams draining into northern San Francisco Bay.

TABLE 3. OCCURRENCE OF FISHES IN VARIOUS COLLECTIONS FROM GUADALUPE RIVER DRAINAGE, 1895 TO 1981

Species	Snyder 1895	Hubbs 1922	Fry 1936	Taft and Shapovalov 1937	Merkel 1953	CDFG 1975	Leidy 1981
Native species							
<i>Salmo gairdnerii</i>	X				X		X
<i>Lavinia symmetricus</i>	X	X	X	X	X	X	X
<i>Ptychocheilus grandis</i>		X					
<i>Gasterosteus aculeatus</i>	X	X	X	X	X		
<i>Catostomus occidentalis</i>	X	X			X		X
<i>Cottus asper</i>	X				X		X
<i>Cottus gulosus</i>						X	X
Nonnative species							
<i>Cyprinus carpio</i>							X
<i>Carassius auratus</i>						X	X
<i>Notemigonus crysoleucas</i>							X
<i>Lepomis gibbosus</i>							X
<i>Lepomis cyanellus</i>							X
<i>Lepomis macrochirus</i>						X	
<i>Lepomis microlophus</i>							X
<i>Pomoxis nigromaculatus</i>							X
<i>Micropterus salmoides</i>							X
<i>Micropterus dolomieu</i>							X
<i>Gambusia affinis</i>					X	X	X
<i>Menidia beryllina</i>							X
<i>Lucania parva</i>							X
<i>Ictalurus nebulosus</i>							X
% Native species	100	100	100	100	83	40	28

TABLE 4. OCCURRENCE OF FISHES IN VARIOUS COLLECTIONS FROM SAN FRANCISQUITO CREEK DRAINAGE, 1855-1981

Species	Cutts 1855	Agassiz 1860	Hughes 1890	Snyder 1905	Grant and				CDFS 1966	CDFS 1974-76	CDFS 1978-79	Leidy 1981
					Shapovalov 1938	Stanton 1939	SJSU 1956-57					
Native species												
<i>Salmo gairdnerii</i>	X			X	X					X		X
<i>Lavinia symmetricus</i>				X	X	X			X	X		X
<i>Ptychocheilus grandis</i>				X								
<i>Gasterosteus aculeatus</i>				X	X	X			X			X
<i>Catostomus occidentalis</i>			X	X					X	X		X
<i>Archeoplites interruptus</i>		X										
<i>Cottus asper</i>				X	X				X			
<i>Cottus gulosus</i>												X
Nonnative species												
<i>Carassius auratus</i>									X			
<i>Lepomis cyanellus</i>								X	X			
<i>Lepomis macrochirus</i>									X		X	
<i>Micropterus salmoides</i>								X				
<i>Gambusia affinis</i>												X
<i>Lucania parva</i>								X				X
<i>Ictalurus nebulosus</i>												
% Native species	100	100	100	100	100	100	40	66	71	66	71	71

TABLE 5. OCCURRENCE OF FISHES IN VARIOUS COLLECTIONS FROM ALAMEDA CREEK DRAINAGE, 1905 TO 1981

Species	Snyder 1905	SU and Follett 1927	Seale 1934	Shap- ovalov 1938	Miller and Murphy 1939	Follett and Peckham 1953	Follett and Peckham 1955	Follett and Peckham 1957-58	Hopkirk 1961	Hopkirk 1966	Accei- tuno et al. 1973	CDFG 1975-76	CDFG 1978	Leidy 1981
Native species														
<i>Salmo gairdnerii</i>		X		X		X	X	X				X	X	?
<i>Lavinia symmetricus</i>	X	X	X	X	X		X	X	X			X	X	X
<i>Lavinia exilicauda</i>	X		X			X	X	X	X	X		X	X	X
<i>Pychocheilus grandis</i>	X	X	X		X	X	X	X	X	X		X	X	X
<i>Orthodon microlepidotus</i>			X		X	X	X	X	X	X		X	X	?
<i>Rhinichthys osculus</i>				X										
<i>Catostomus occidentalis</i>	X	X	X		X	X	X	X	X	X		X	X	X
<i>Gasterosteus aculeatus</i>			X			X	X	X	X	X				X
<i>Lampetra ayresii</i>										X				
<i>Lampetra tridentata</i>						X	X	X						
<i>Hysteroecarpus traskii</i>	X	X	X			X	X	X	X	X		X	X	X
<i>Archoptiles interruptus</i>														
<i>Cottus asper</i>	X	X	X	X	X	X	X	X	X	X		X	X	X
<i>Cottus gulosus</i>				X										
Nonnative species														
<i>Cyprinus carpio</i>						X	X	X					X	X
<i>Carassius auratus</i>													X	X
<i>Notemigonus crysoleucas</i>												X	X	X
<i>Lepomis cyanellus</i>												X	X	X
<i>Lepomis macrochirus</i>									X	X		X	X	X
<i>Micropterus salmoides</i>				X		X	X	X	X	X		X	X	X
<i>Micropterus dolomieu</i>				X		X	X	X	X	X		X	X	X
<i>Pomoxis nigromaculatus</i>														
<i>Gambusia affinis</i>									X	X		X	X	X
<i>Menidia beryllina</i>														
<i>Percina macrolepida</i>										X				
<i>Lucania parva</i>										X				X
<i>Ictalurus nebulosus</i>									X					X
<i>Ictalurus melas</i>														X
<i>Ictalurus catus</i>							X							
% Native species	100	100	100	100	100	67	67	67	50	60	67	58	67	44

Mylopharodon conocephalus is rare in study streams because a suitable habitat is lacking. The only collection record for this species is for the Napa River where it was collected in 1972. Apparently the severe drought of 1976-77 eliminated or dramatically reduced populations of this species in the drainage (Peter B. Moyle, personal communication). *Hysteroecarpus traskii* never exhibited widespread distribution in study area streams. Small populations persist in Alameda, Suisun, and Green Valley creeks. It is extinct in the Coyote Creek drainage, apparently as the result of habitat alteration and competition from introduced centrarchids. According to John D. Hopkirk (personal communication), this species may occur in the tidal marshes of the Napa and Petaluma rivers. *Archoplites interruptus* has never been common in study area streams. Historically it occurred only in Coyote and San Francisquito creeks, where it is now extinct. Small populations are known to occur in Alameda Creek where it was introduced following construction of Calaveras Reservoir in 1924. This species is also found in Lake Anza, Alameda County, where it was introduced in the early 1950s. The sensitivity of this species to habitat alteration and possibly competition from introduced centrarchids has, no doubt, eliminated it from much of its historical range.

The status of three species, *Lampetra tridentata*, *L. ayresii*, and *L. pacifica* in the study area streams is unknown. Because these species are buried in the stream bottom during development and undergo spawning migrations during high flows, they are often difficult to collect. *Lampetra tridentata* is probably the most common of the three species as it is known to occur in several study area streams. Single distributional records exist for both *L. ayresii* and *L. pacifica*, and these species should be considered uncommon. However, further sampling for these species during spawning migrations and in suitable habitat is necessary before their status in the Bay drainage can be determined.

During this study, 56 percent of the sampling stations were found to be dominated by native species, while introduced species dominated only 17 percent of the stations (table 6). By dividing the study area into three geographic regions, it was possible to detect species' frequency of occurrence in fish assemblages.

North Bay drainages include those streams within Marin, Sonoma, Napa, and Solano counties that flow into San Francisco Bay. North Bay drainages, in general, are not heavily urbanized but many stream habitats have been extensively altered by agriculture. Vegetation removal, siltation, and chemical pollution are noticeable consequences of agricultural development in the North Bay.

East Bay drainages include the Alameda Creek drainage northward and streams entering the Bay from Contra Costa County. Although urbanization and cattle grazing have drastically altered many stream habitats, a few streams remain relatively undisturbed.

South Bay drainages are comprised of streams south of the Alameda Creek drainage and include portions of Alameda, Santa Clara, and San Mateo counties. South Bay drainages have been heavily urbanized at mid to low elevations while poor range management has resulted in the destruction of stream habitats in headwater regions. Channelization, vegetation removal, pollution, and siltation are recognizable effects of urbanization in streams throughout the South Bay.

Based on frequency of occurrence, native species dominated fish associations in 71 percent of the North Bay sampling localities (table 6). This was significantly higher than the 58 percent native dominance recorded for East Bay streams ($Z^2 = 6.21$; $p < 0.01$; Chiang and Selvin 1980), and the 42 percent for the South Bay streams ($Z^2 = 21.08$; $p < 0.01$).

Introduced species exhibited the lowest frequency of occurrence in North Bay streams (9 percent) while East Bay and South Bay streams showed a significantly higher frequency

of occurrence of introduced species at 16 percent and 22 percent respectively ($Z^2 = 3.23$; $p \ll 0.01$ and $Z^2 = 8.86$; $p \ll 0.01$).

Stream disturbance might also be measured by the number of sampling localities that contained no fish. During this study, eighty-one sampling localities were fishless. In South Bay streams, 30 percent of the sampling locations contained no fish (table 6), significantly higher than the 9 percent figure for North Bay streams ($Z^2 = 1.24$; $p \ll 0.01$).

TABLE 6. FREQUENCY OF OCCURRENCE OF NATIVE AND INTRODUCED FISHES
BY REGION AT 457 COLLECTING LOCALITIES
IN STREAMS TRIBUTARY TO SAN FRANCISCO BAY*

	North Bay	East Bay	South Bay	Total
Native fish only	61 (64.8)	82 (43.2)	66 (38.1)	209 (45.8)
Introduced fish only	3 (3.1)	15 (7.9)	27 (15.6)	45 (9.8)
Native species more abundant than introduced species	10 (10.8)	28 (14.7)	8 (4.6)	46 (10.1)
Introduced species more abundant than native species	5 (5.4)	15 (7.9)	11 (6.4)	31 (6.8)
Native species equal to introduced species	6 (6.5)	30 (15.8)	9 (5.2)	45 (9.8)
No catch	9 (9.6)	20 (10.5)	52 (30.1)	81 (17.7)
Total number of stations	94 (100)	190 (100)	173 (100)	457 (100)
Total number of stations with native species dominant	71 (5.5)	110 (57.9)	72 (41.6)	255 (55.8)
Total number of stations with introduced species dominant	8 (8.5)	30 (15.8)	38 (22.0)	76 (16.6)

*Numbers represent total occurrence; numbers in parentheses represent percentage of occurrences.

Species Ecology

General patterns of species occurrence and habitat preference for both native and introduced fishes were evident in the San Francisco Bay drainage basin (tables 7, 8, and 9). The abundance of native fishes was positively correlated with the occurrence of other native species. For example, *Salmo gairdnerii* and *Cottus gulosus*, two headwater species, occurred almost exclusively with native fishes (table 7). An important exception was *Lavinia exilicauda*. This species was usually associated with introduced fishes in the deep pools of disturbed lowland stream habitats. Moyle and Nichols (1973), in a study conducted in foothill streams of the central Sierra Nevada, also found *L. exilicauda* most abundant where introduced species, especially *Lepomis cyanellus*, *Micropterus salmoides*, and *Gambusia affinis*, were common.

In the study area, native fishes were most abundant in stream habitats with little noticeable human disturbance (table 7). Typically, these habitats were low in turbidity, unsilted, and well shaded, had extensive and diverse cover, and contained few other species. Although native fishes did occur in channelized sections of streams, they were abundant only where plant succession resulted in revegetation of channelized levee sections.

In addition to *Lavinia exilicauda*, populations of the native species *Gasterosteus aculeatus*, *Catostomus occidentalis*, and *Cottus asper* were found to be tolerant of moderately disturbed stream environments (table 7). These species exhibited wide distributions throughout the study area from undisturbed, intermittent, headwater streams to disturbed pools of permanent, low-elevation streams flowing through heavily urbanized environments.

The abundance of introduced species shows a significant negative correlation to the occurrence of native species (table 8). Introduced species were usually found in large species assemblages when compared with native species. These groups were composed primarily of other introduced fishes.

In the study area, introduced species were most abundant in large, highly disturbed pools at low and intermediate elevations, often in channelized stream sections (table 8). These pool habitats tended to contain more silt and rubble than similar pool habitats in which native fishes were abundant. Introduced species were seldom abundant in riffle habitats, or in pools with gravel or cobble substrates.

Certain introduced fishes, such as *Lepomis cyanellus*, *L. macrochirus*, and *Micropterus salmoides*, were most abundant in pools with extensive cover in the form of rooted and floating aquatic vegetation, with little shading of the water surface by terrestrial vegetation (table 8). However, the abundance of other introduced species such as *Notemigonus crysoleucas*, *Gambusia affinis*, and *Menidia beryllina* showed a significant negative correlation with increases in the quality and amount of cover (table 8). These species preferred open, unshaded pools with only moderate amounts of aquatic vegetation. *Ictalurus melas* was the only introduced species showing a significant positive correlation between its abundance and the percentage of the water surface shaded (table 8).

The abundance of four species of introduced fishes, *Gambusia affinis*, *Lucania parva*, *Menidia beryllina*, and *Acanthogobius flavimanus*, showed significant negative correlations with increasing elevation (table 8). These fishes were most abundant in the lower reaches of disturbed streams, immediately above the freshwater/tidal interface. All of these species, with the exception of *G. affinis*, may be considered estuarine fishes that are able to tolerate widely fluctuating salinity levels, high water temperatures, and turbid water conditions. *Gambusia affinis*, while not considered a true estuarine species, can complete its life cycle in brackish sloughs (Moyle 1976a).

Out of 457 sampling localities, 81 (18 percent) were without fish. Comparisons among means of environmental variables at sampling locations containing no fish with all locations containing fish are presented in table 10. Sampling locations containing no fish differed from those with fish in several important respects.

Fishless habitats were typically at a lower elevation ($\bar{x} = 96$ m), had shallower water ($\bar{x} = 0.01$ m), and exhibited a higher degree of human disturbance ($\bar{x} = 3.2$) than habitat samples containing fish ($\bar{x} = 103$ m; $\bar{x} = 0.3$ m; $\bar{x} = 2.7$, respectively; see table 10). Many samples without fish were from stream sections in heavily urbanized areas. A comparison between substrate types for sampling locations with ($\bar{x} = 41.2$) and without ($\bar{x} = 41.7$) fish shows no significant difference between the two groups for the silt component. However, fishless samples on the average contained significantly less sand, gravel, and bedrock/boulders, and a greater amount of rubble than samples containing fish (table 10). Amount of cover available to fish was significantly less and of lower quality for samples without fish ($\bar{x} = 2.3$, $p < 0.001$) than for samples containing fish ($\bar{x} = 3.4$). Much of this difference is evident in the fact that sample locations with fish had significantly more rooted aquatic vegetation ($\bar{x} = 11.3\%$, $p < 0.001$) than sites without fish ($\bar{x} = 7.0\%$). Although fishless samples contained more floating aquatic vegetation ($\bar{x} = 8.5\%$, $p < 0.05$) than samples with fish ($\bar{x} = 7.2\%$), it was usually in the form of thick, choking mats of algae which reduced the quality and amount of cover potentially available to fish. There was no significant difference in the percentage of natural channel between the two stream groups. However, streams containing fish were generally larger, and exhibited a greater ratio of pools to riffles than streams without fish (table 10).

TABLE 7. MEANS OF ENVIRONMENTAL VARIABLES ASSOCIATED WITH EIGHT SPECIES OF FISHES NATIVE TO THE STREAMS OF THE SAN FRANCISCO BAY DRAINAGE¹

Variable	Species ²							
	RBT	RS	PS	RCH	HCH	SQW	SS	STB
Number samples	77	26	34	142	43	32	87	166
Elevation (m)	170\$	150†	58	115\$	66	71	94	44
Mean depth (m)	0.02*	0.02	0.03	0.03	0.05‡	0.04†	0.03‡	0.02
Maximum depth (m)	0.12*	0.13	0.13	0.13	0.18†	0.19\$	0.16‡	0.12
Turbidity (0-5)	0.5***	0.4**	1.7	1.6***	2.9	2.3	1.9	2.1
Substrate types (%)								
Silt	11.2***	12.8**	27.6**	29.6***	56.7	34.3	37.3	45.3*
Sand	12.7†	14.8\$	12.9	11.8	10.1	12.3	12.2	12.8
Gravel	41.0†	44.2†	41.0†	36.3\$	21.0	38.0	35.3	30.0
Cobbles	16.1\$	14.0	10.3	9.4\$	2.3***	7.8	6.0*	4.6
Bedrock/boulders	18.3\$	14.6	7.7	10.3‡	5.2	7.4	7.6	5.2
Rubble	0.4*	0.0	0.9	2.6	2.0	0.2	1.3	2.6
Surface shade (%)	65.3\$	68.3\$	37.4	42.1	21.3*	26.8	41.5	40.0
Rooted vegetation (%)	2.1***	2.9**	12.5	10.6	10.0	9.2	12.6	11.9
Floating vegetation (%)	1.4**	1.8	9.1	7.1	2.6	7.3	7.8**	12.0
Cover (0-5)	3.9‡	4.1†	4.0†	3.4\$	2.8	3.5	3.7	3.4
Man disturbance (0-5)	1.5***	1.2**	2.6	2.5***	3.5	2.7	2.9	3.2*
Natural channel (%)	99.3\$	99.9\$	79.4	83.0\$	51.8*	70.0	78.4\$	69.5
Pools (%)	83.7**	84.5**	93.7†	89.5	91.0	93.5	91.8†	92.2†
Riffles (%)	16.3‡	15.8‡	6.3	10.5	9.0	6.5	8.2*	7.8
Stream type (1-5)	3.3‡	3.8	3.5	2.9‡	3.0	3.4\$	3.1	2.4
Number of species	1.7**	2.6	3.9*	3.0	3.9	4.5	3.6*	2.7**
Native fish (%)	99.2\$	99.9\$	83.9\$	90.8\$	62.5	80.5\$	89.9\$	85.3\$

¹Significant positive correlation (†p < 0.05; ‡p < 0.01; \$p < 0.001) between the variable and means of percentages of occurrence of fish species in the matrix for all localities (N = 457). Significant negative correlation (*p < 0.05; **p < 0.01; ***p < 0.001), as above.

²RBT = *Salmo gairdnerii*; RS = *Cottus gulosus*; PS = *Cottus asper*; RCH = *Lavinia symmetricus*; HCH = *Lavinia exilcauda*; SQW = *Ptychocheilus grandis*; SS = *Catostomus occidentalis*; STB = *Gasterosteus aculeatus*.

TABLE 8. MEANS OF ENVIRONMENTAL VARIABLES ASSOCIATED WITH ELEVEN INTRODUCED SPECIES OF FISHES IN STREAMS OF THE SAN FRANCISCO BAY DRAINAGE¹

Variable	Species ²										
	BBH	CRP	GF	GS	RWK	GAM	ISS	GSH	LMB	BG	YFG
Number samples	9	12	16	9	18	105	8	34	22	8	7
Elevation (m)	77	34	68	140\$	4*	79*	21*	81	99	125	2*
Mean depth (m)	0.07\$	0.04	0.05†	0.06†	0.04	0.03†	0.05\$	0.05‡	0.03‡	0.05†	0.05\$
Maximum depth (m)	0.22‡	0.16	0.19‡	0.28†	0.14	0.13†	0.16\$	0.19‡	0.18†	0.17†	0.16
Turbidity (0-5)	3.1\$	3.8	3.5‡	2.3	4.0‡	2.8\$	2.8*	2.6\$	2.9\$	3.1\$	3.7
Substrate types (%)											
Silt	50.0‡	67.1	50.3‡	58.0†	77.8‡	62.7‡	29.4	41.9†	51.4†	59.4\$	56.4
Sand	13.9	12.1	8.1	13.9	8.2	8.0*	20.6\$	16.8	7.7	11.5	20.0
Gravel	25.0*	12.1	28.8	13.9	10.4	15.2***	30.6	26.2	4.1*	10.6**	20.7
Cobbles	1.7*	0.42**	2.2*	2.0*	0.0	3.2*	6.3	3.8	28.0	1.9*	2.9*
Bedrock/boulders	9.4	1.3	5.0	11.7	0.83	4.8***	1.9	8.8†	6.4*	14.4‡	1.4*
Rubble	0.0	7.1\$	6.0‡	0.6	2.5	4.6\$	11.4\$	2.6	2.5	2.5†	0.0
Surface shade (%)	17.7‡	15.2	24.5	11.7*	5.8**	15.1*	10.4**	37.9*	35.1*	25.6*	4.7
Rooted vegetation (%)	9.0	15.0	14.8	7.6	13.6	15.7†	13.9	14.3†	10.6†	9.3†	8.0
Floating vegetation (%)	2.7	5.6	2.1	2.9	12.0	8.6	1.9	9.5\$	5.9	1.4	2.3
Cover (0-5)	2.9	3.3	3.4	3.4**	2.9	2.9**	3.3*	4.1\$	3.6†	3.6†	2.6
Man disturbance (0-5)	2.9	4.4‡	3.8\$	3.4‡	4.6\$	3.9\$	3.6\$	2.9	3.2‡	3.5‡	3.9
Natural channel (%)	72.2	21.0***	46.9*	63.9	8.3***	44.8*	50.0*	80.9	75.0	75.0	35.7*
Pools (%)	92.2‡	96.7\$	87.5\$	90.0†	97.8\$	93.5†	87.5†	94.4\$	95.2‡	99.4\$	94.3
Riffles (%)	7.8**	3.3**	12.4*	10.0*	2.2***	6.5*	12.5*	5.6**	4.8**	0.6**	5.7
Stream type (1-5)	2.9	2.8	3.6	3.2	2.3	2.3***	4.4*	2.7	3.0	2.5	2.5
Number of species	5.0†	5.4†	4.6†	6.1†	3.7*	2.9*	6.1†	4.3†	4.4	4.5	4.3
Native fish (%)	62.8*	41.5***	53.2**	53.0**	29.7**	32.6***	41.9***	60.5***	54.5***	66.8*	46.9*

¹Significant positive correlation (†p < 0.05; ‡p < 0.01; §p < 0.001) between the variable and means of percentages of occurrence of fish species in the matrix for all localities (N = 457). Significant negative correlation (*p < 0.05; **p < 0.01; ***p < 0.001), as above.

²BBH = *Ictalurus melas*; CRP = *Cyprinus carpio*; GF = *Carassius auratus*; GS = *Notemigonus crysoleucas*; RWK = *Lucania parva*; GAM = *Gambusia affinis*; ISS = *Menidia beryllina*; GSH = *Lepomis cyanellus*; LMB = *Micropterus salmoides*; BG = *Lepomis macrochirus*; YFG = *Acanthogobius flavimanus*.

TABLE 9. PATTERNS OF FISH SPECIES CO-OCCURRENCE

Species characterizing samples	RBT	CR	HH	SQW	CRP	GF	GS	BBH	SS
<i>Salmo gairdnerii</i> (RBT)	54.8 2.2	24.2*** 1.3	0.0 0.0	<1.0*** 0.1	0.0 0.0	<1.0*** 0.1	0.0 0.0	0.0 0.0	2.6** 0.4
<i>Lavinia symmetricus</i> (CR)	2.8*** 0.3	60.0 3.4	1.8*** 0.2	1.9*** 0.3	<1.0*** <0.1	<1.0*** 0.1	<1.0*** <0.1	<1.0*** <0.1	4.8*** 0.8
<i>Lavinia exilcauda</i> (HH)	0.0 0.0	10.0** 0.7	39.6 2.8	2.2** 0.4	<1.0** 0.2	<1.0** 0.2	<1.0** <0.1	<1.0** <0.1	2.2** 0.4
<i>Ptychocheilus grandis</i> (SQW)	<1.0** 0.2	28.2 2.1	10.9** 0.8	12.4 1.7	<1.0** 0.1	<1.0** <0.1	<1.0** <0.1	<1.0** <0.1	9.6 1.4
<i>Cyprinus carpio</i> (CRP)	0.0 0.0	5.0 1.0	10.4 1.6	<1.0** 0.3	9.9 1.3	<1.0 0.5	<1.0 0.4	7.4* 0.3	<1.0* 0.4
<i>Carassius auratus</i> (GF)	<1.0** 0.1	35.0 2.3	3.9* 0.9	<1.0** 0.1	<1.0** 0.4	12.0 1.5	<1.0* <0.1	<1.0* <0.1	2.8* 0.7
<i>Notemigonus crysoleucas</i> (GS)	0.0 0.0	11.6 0.9	31.5 2.4	<1.0* 0.3	<1.0* 0.6	1.1* 0.6	2.4 1.3	1.6 0.2	5.3 1.0
<i>Ictalurus melas</i> (BBH)	0.0 0.0	16.3 1.1	17.7 1.2	<1.0* 0.2	<1.0* 0.3	<1.0** 0.1	<1.0* 0.3	30.9 1.7	17.9 1.3
<i>Catostomus occidentalis</i> (SS)	<1.0** 0.2	30.3* 2.2	3.4** 0.3	2.5** 0.4	<1.0** <0.1	<1.0** <0.1	<1.0** <0.1	<1.0** 0.1	21.7 2.2
<i>Menidia beryllina</i> (ISS)	0.0 0.0	5.9 0.5	15.2 1.3	2.3* 0.8	<1.0** 0.4	0.0 0.0	<1.0** 0.1	<1.0** 0.1	1.7 0.5
<i>Lepomis cyanellus</i> (GSH)	<1.0** <0.1	24.8 1.7	6.7* 0.7	<1.0** 0.1	<1.0** <0.1	<1.0** <0.1	<1.0** 0.2	2.0** 0.2	6.4* 0.8
<i>Micropterus salmoides</i> (LMB)	0.0 0.0	10.5 1.2	11.5 0.8	3.2* 0.3	<1.0** <0.1	<1.0** <0.1	<1.0** 0.3	3.9** 0.1	3.5* 0.6
<i>Lepomis macrochirus</i> (BG)	0.0 0.0	16.7 1.5	17.7 1.1	1.1** 0.4	0.0 0.0	<1.0** 0.1	<1.0** 0.3	0.0 0.0	2.5* 0.8
<i>Gambusia affinis</i> (GAM)	<1.0** <0.1	9.8** 0.8	5.8** 0.6	<1.0** 0.1	<1.0** 0.1	<1.0** 0.1	<1.0** <0.1	<1.0** <0.1	1.8** 0.3
<i>Gasterosteus aculeatus</i> (STB)	<1.0** 0.2	13.6** 1.2	2.7** 0.2	<1.0** <0.1	<1.0** <0.1	<1.0** <0.1	<1.0** <0.1	<1.0** <0.1	1.9** 0.6
<i>Lucania parva</i> (RWK)	0.0 0.0	<1.0** 0.1	6.7* 0.7	<1.0** <0.1	<1.0** 0.3	<1.0** 0.2	<1.0** 0.1	0.0 0.0	0.0 0.0
<i>Acanthogobius flavimanus</i> (YFG)	0.0 0.0	0.0 0.0	6.2 0.7	<1.0** 0.3	<1.0** 0.1	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
<i>Cottus asper</i> (PS)	2.5** 0.3	24.3 1.6	4.6** 0.4	3.3** 0.4	<1.0** <0.1	0.0 0.0	<1.0** <0.1	<1.0** <0.1	4.5** 0.9
<i>Cottus gulosus</i> (RS)	19.4 1.2	34.8 1.8	<1.0** 0.1	<1.0** 0.1	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	3.3** 0.5

¹NF = % Native fishes in samples; ²SP = mean number of species in sample; ³N = number of samples containing species; * (p < 0.05); ** (p < 0.01); *** (p < 0.001).

IN STREAMS OF THE SAN FRANCISCO BAY DRAINAGE

ISS	GSH	LMB	BG	GAM	STB	RWK	YFG	PS	RS	NF ¹	SP ²	N ³
0.0 0.0	<1.0*** <0.1	0.0 0.0	0.0 0.0	<1.0*** <0.1	11.8*** 0.8	0.0 0.0	0.0 0.0	<1.0*** 0.1	4.3*** 0.4	99.2***	2.1	77
<1.0*** <0.1	1.0*** 0.2	<1.0*** 0.1	<1.0*** <0.1	7.1*** 0.6	17.1*** 1.4	<1.0*** <0.1	0.0 0.0	1.2*** 0.2	<1.0*** 0.2	90.8**	3.0	142
<1.0** <0.1	2.0** 0.3	2.0** 0.3	<1.0** <0.1	26.9*** 1.8	10.0** 0.9	1.0** 0.1	<1.0** 0.1	1.0** 0.2	1.0** <0.1	62.5**	3.9	43
3.1** 0.2	<1.0** 0.2	1.2** 0.2	1.1** 0.2	10.6 0.9	16.8 1.3	<1.0** <0.1	<1.0** 0.1	3.6** 0.5	<1.0** <0.1	80.5**	4.5	32
<1.0** 0.1	<1.0** 0.2	<1.0** 0.2	0.0 0.0	40.0* 3.1	19.2 1.6	1.0* 0.7	<1.0** <0.1	1.0* 0.2	0.0 0.0	41.5*	5.4	12
<1.0** <0.1	2.0* 0.2	<1.0** 0.1	<1.0** <0.1	31.5 2.2	5.2 0.4	4.7* 0.4	0.0 0.0	0.0 0.0	0.0 0.0	53.2*	4.6	16
<1.0* 0.1	4.8 0.9	<1.0* 0.7	1.7 0.3	32.5 2.4	4.1 0.7	<1.0* 0.3	0.0 0.0	<1.0* 0.3	0.0 0.0	53.0**	6.1	11
<1.0* 0.1	4.9 0.8	1.6** 0.1	0.0 0.0	7.2 0.7	1.1* 0.6	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	62.8	5.0	9
<1.0** <0.1	2.0** 0.3	<1.0** 0.1	<1.0** <0.1	5.3** 0.5	30.0 1.9	0.0 0.0	0.0 0.0	<1.0** 0.3	1.4** 0.2	89.9**	3.6	87
34.4 2.6	<1.0* 0.3	<1.0* 0.4	0.0 0.0	13.6 1.1	13.2 1.4	<1.0** 0.1	2.8** 0.8	1.9* 1.1	0.0 0.0	41.9	6.1	8
<1.0** <0.1	20.2 1.7	1.7** 0.3	<1.0** 0.2	14.2 1.1	20.2 1.6	<1.0** <0.1	0.0 0.0	<1.0** 0.2	0.0 0.0	60.5**	4.3	34
<1.0** <0.1	2.4** 0.4	27.2 1.7	1.4** 0.3	13.8** 0.8	20.8** 1.3	0.0 0.0	0.0 0.0	<1.0** 0.3	0.0 0.0	54.5**	4.4	22
0.0 0.0	<1.0** 0.3	1.7** 0.6	17.9 2.9	11.7 1.2	28.8 2.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	66.8*	4.5	8
<1.0** <0.1	<1.0** 0.2	<1.0** <0.1	<1.0** <0.1	63.6 3.6	14.7** 1.3	<1.0** <0.1	<1.0** <0.1	<1.0** <0.1	<1.0** <0.1	32.6**	2.9	105
<1.0** 0.2	<1.0** 0.2	<1.0 <0.1	<1.0** <0.1	9.1** 0.8	62.7 3.6	1.5** 0.2	<1.0** <0.1	5.7** 0.2	<1.0** <0.1	85.3**	2.7	166
1.7** 0.3	<1.0** <0.1	0.0 0.0	0.0 0.0	48.9 3.2	23.1 2.3	18.0 2.8	<1.0** 0.3	<1.0** 0.2	0.0 0.0	29.7**	3.7	18
24.0 1.9	0.0 0.0	0.0 0.0	0.0 0.0	2.3 0.4	37.6 2.9	8.4 1.4	17.8 1.4	2.7 0.7	0.0 0.0	46.9	4.3	7
4.6** 0.4	1.1** 0.2	<1.0** 0.2	0.0 0.0	8.6* 0.8	30.8** 2.0	<1.0** 0.1	<1.0** 0.2	12.6 1.7	<1.0** <0.1	83.9**	3.9	34
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	<1.0** 0.1	5.1** 0.3	0.0 0.0	0.0 0.0	<1.0** 0.2	36.2 1.9	99.9*	2.6	26

TABLE 10. COMPARISONS OF MEANS OF ENVIRONMENTAL VARIABLES
AT SAMPLING LOCATIONS CONTAINING NO FISH
WITH ALL LOCATIONS CONTAINING FISH*

Environmental variable	Sampling locations containing no fish	All sampling locations containing fish
Number of samples	81	376
Elevation (m)	96**	103
Mean depth	0.01**	0.03
Maximum depth (m)	0.06**	0.12
Turbidity (0-5)	1.6	1.9
Substrate types (%)		
Silt	41.2	41.7
Sand	8.5**	11.6
Gravel	28.1*	29.5
Cobbles	6.3	6.9
Bedrock/boulders	4.6**	8.5
Rubble	11.0**	2.3
Surface shade (%)	46.2**	41.2
Rooted vegetation (%)	7.0**	11.3
Floating vegetation (%)	8.5*	7.2
Cover (0-5)	2.3**	3.4
Human disturbance (0-5)	3.2*	2.7
Natural channel (%)	74.0	74.0
Pools (%)	81.7**	91.7
Riffles (%)	18.3**	8.3
Stream type (1-5)	1.7	2.6

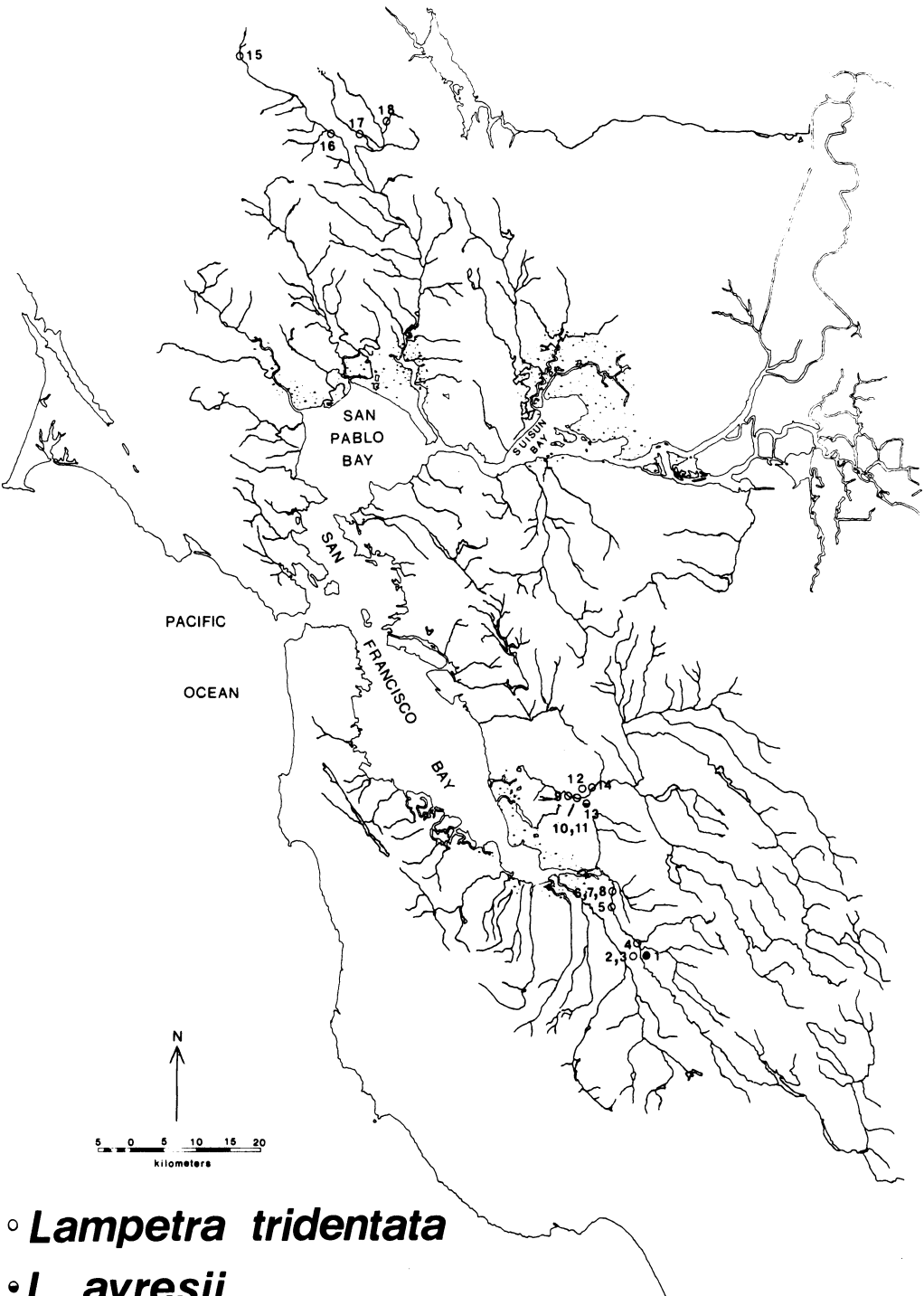
Significant difference between means ($p < 0.05$; ** $p < 0.001$).

CONCLUSIONS

Perhaps the best indication of change in the fish assemblages in San Francisco Bay streams is the dramatic increase in the number of introduced species over the past 40 years. Since 1940, the number of introduced fishes has increased from 3 to 25 species, an 88 percent increase. Of greater significance is the 28 percent increase in introduced species within the 5-year period, 1976 to 1981. The increase in the number of exotic fishes corresponds with extensive urbanization of the drainage beginning in the 1940s and continuing today.

Despite over 100 years of fish introductions and a longer period of habitat alterations by humans, native fishes still dominate fish assemblages in many streams. The distributional pattern of fishes for the entire San Francisco Bay drainage is one of persistence by native species assemblages in unaltered habitats, while introduced fishes dominate disturbed stream environments. In numerous instances both native and introduced species occurred together in large numbers. This in no way implies that native fish assemblages have not been severely reduced in number and are not in danger of further population declines. Local extinctions of isolated populations of native fishes throughout the basin will continue to occur should aquatic habitat alteration continue at present rates.

Fig. 2



- ***Lampetra tridentata***
- ***L. ayresii***
- ***L. pacifica***

Fig. 3

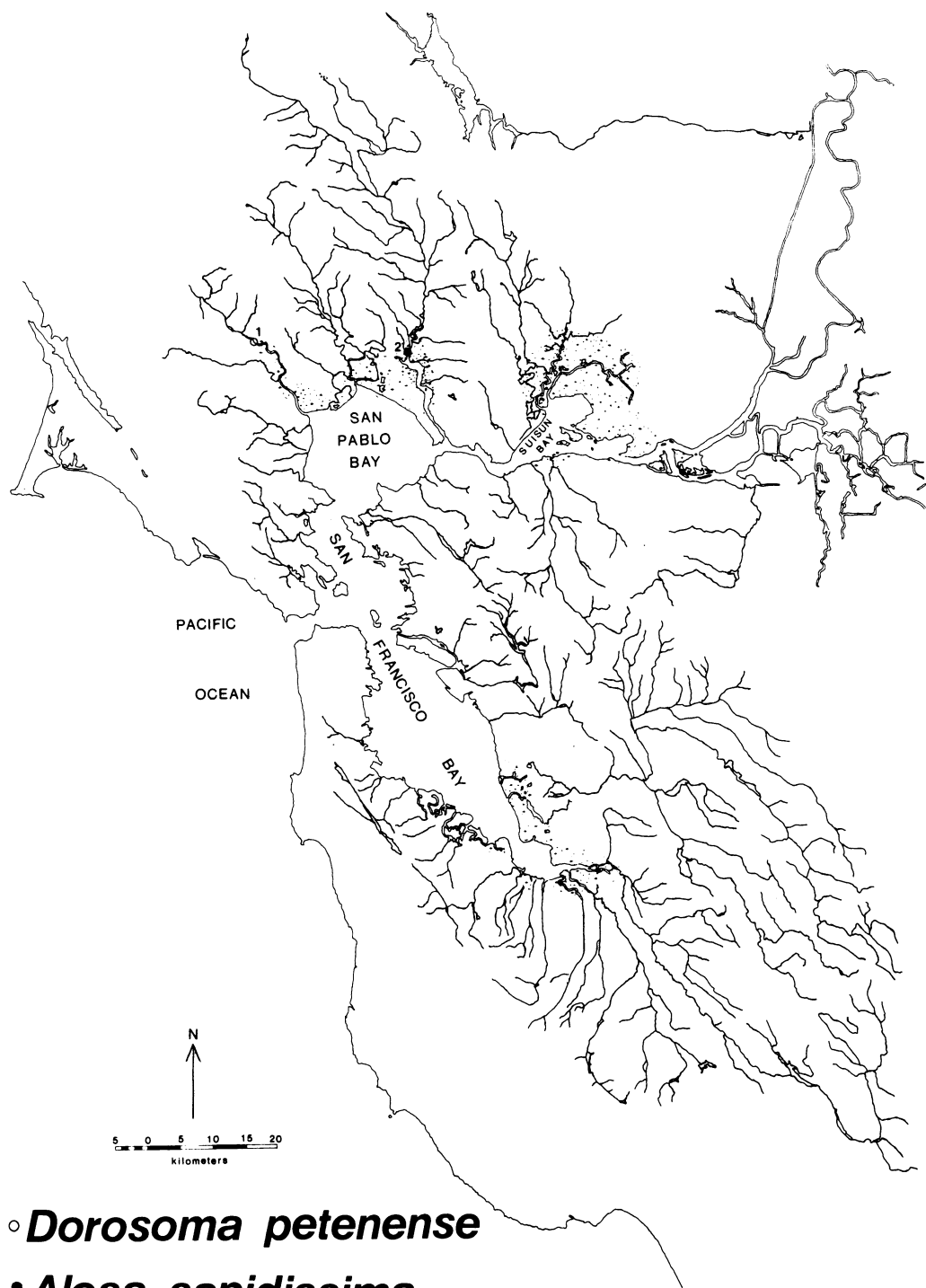


Fig. 4

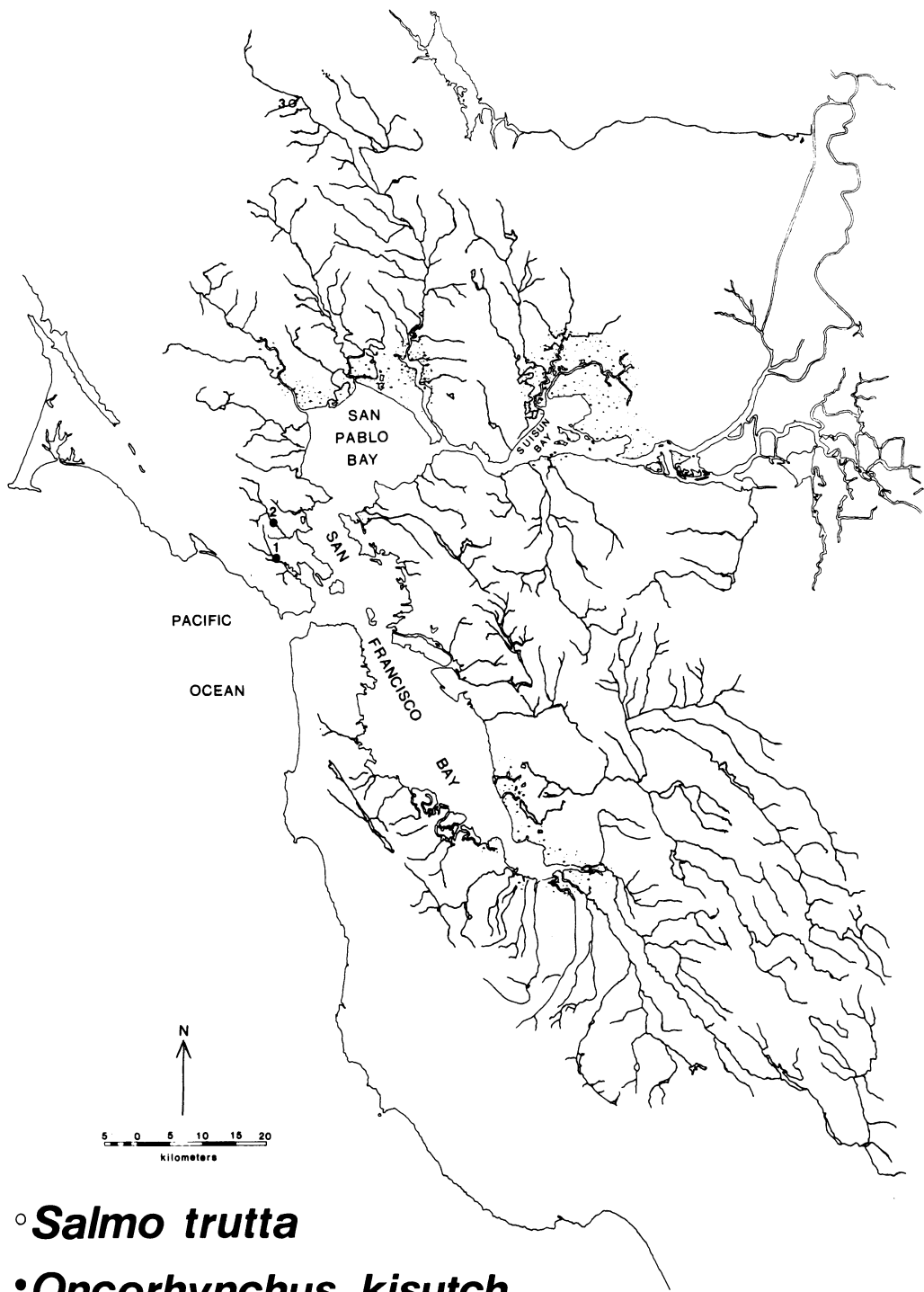


Fig. 5

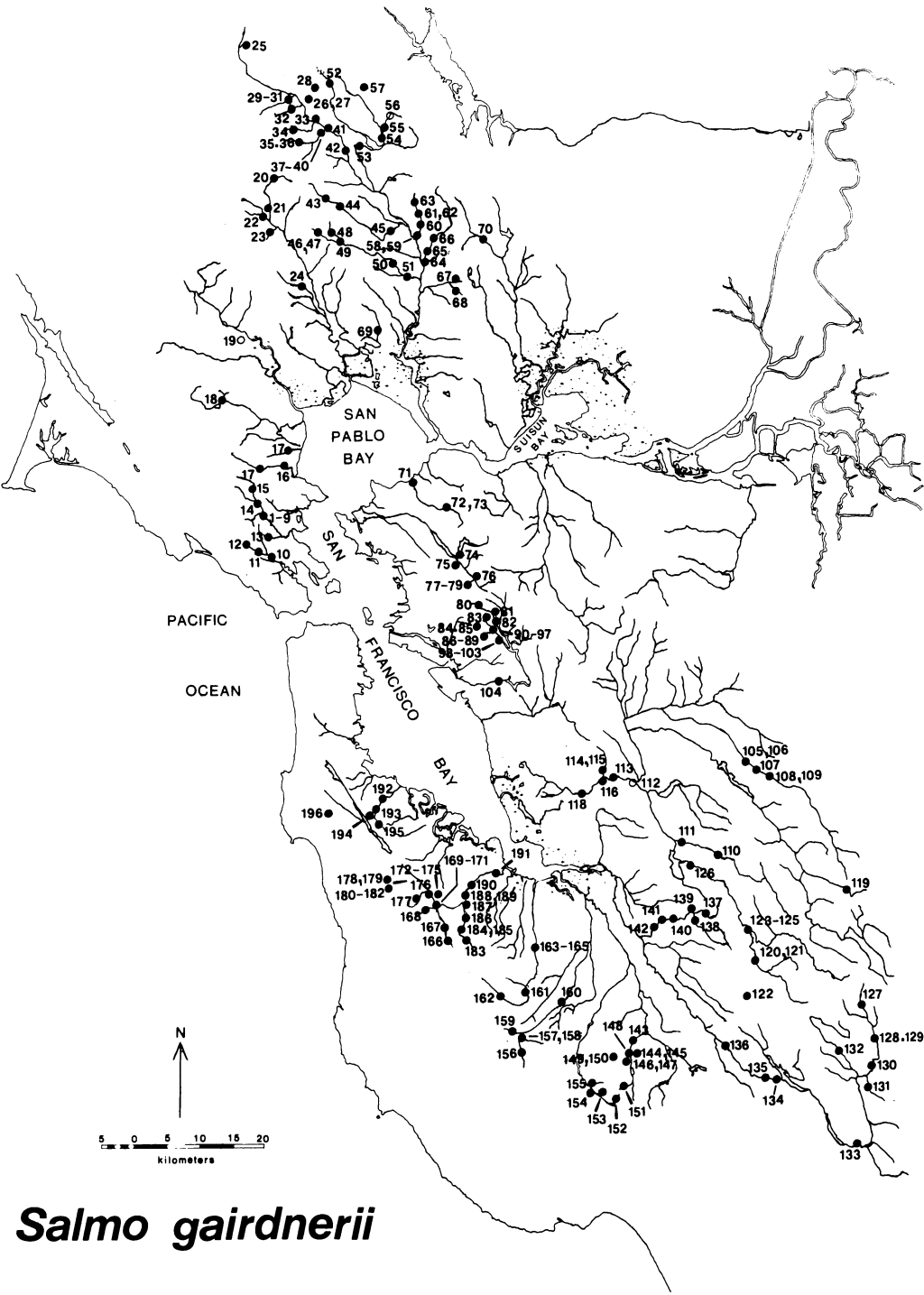


Fig. 6

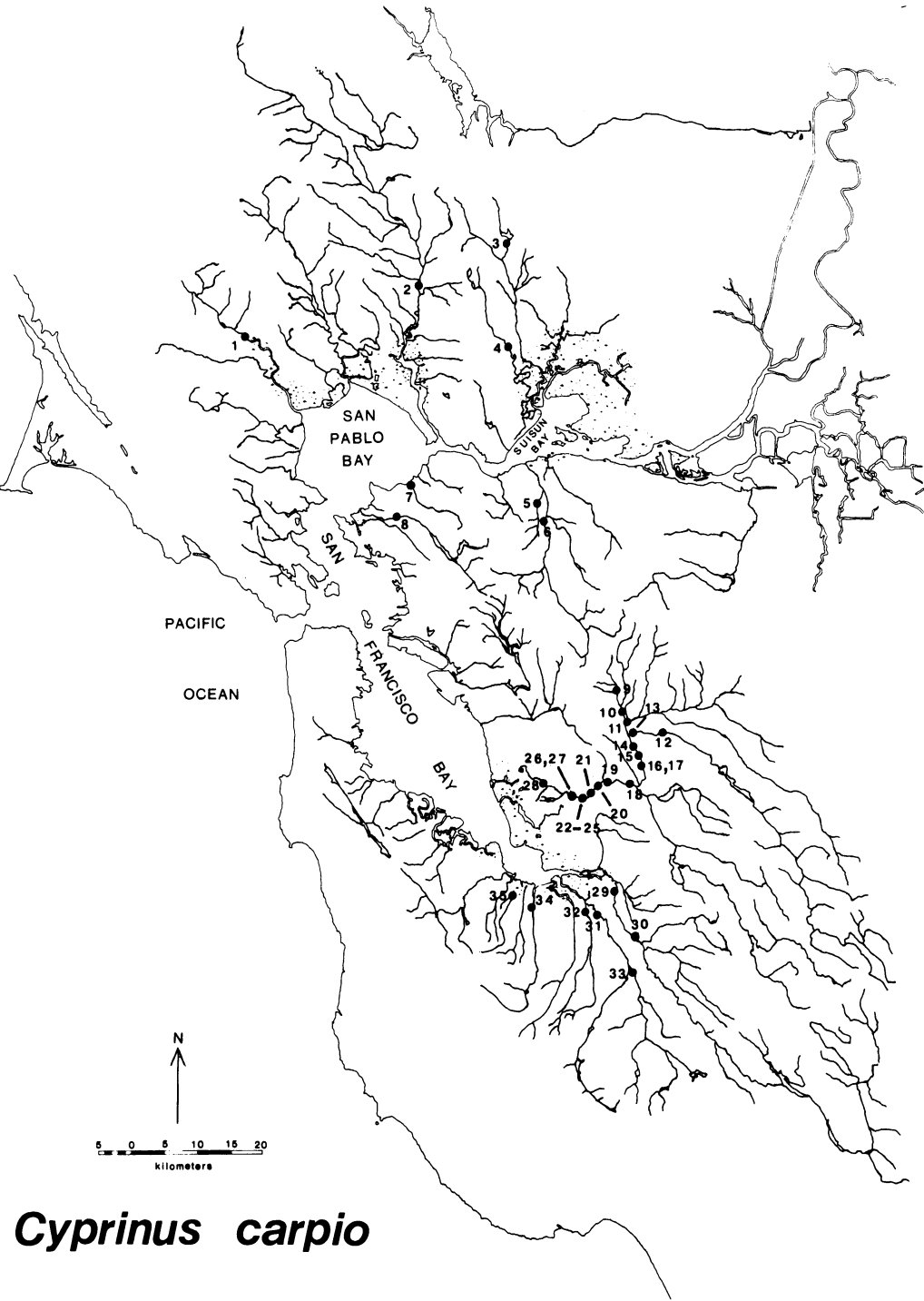
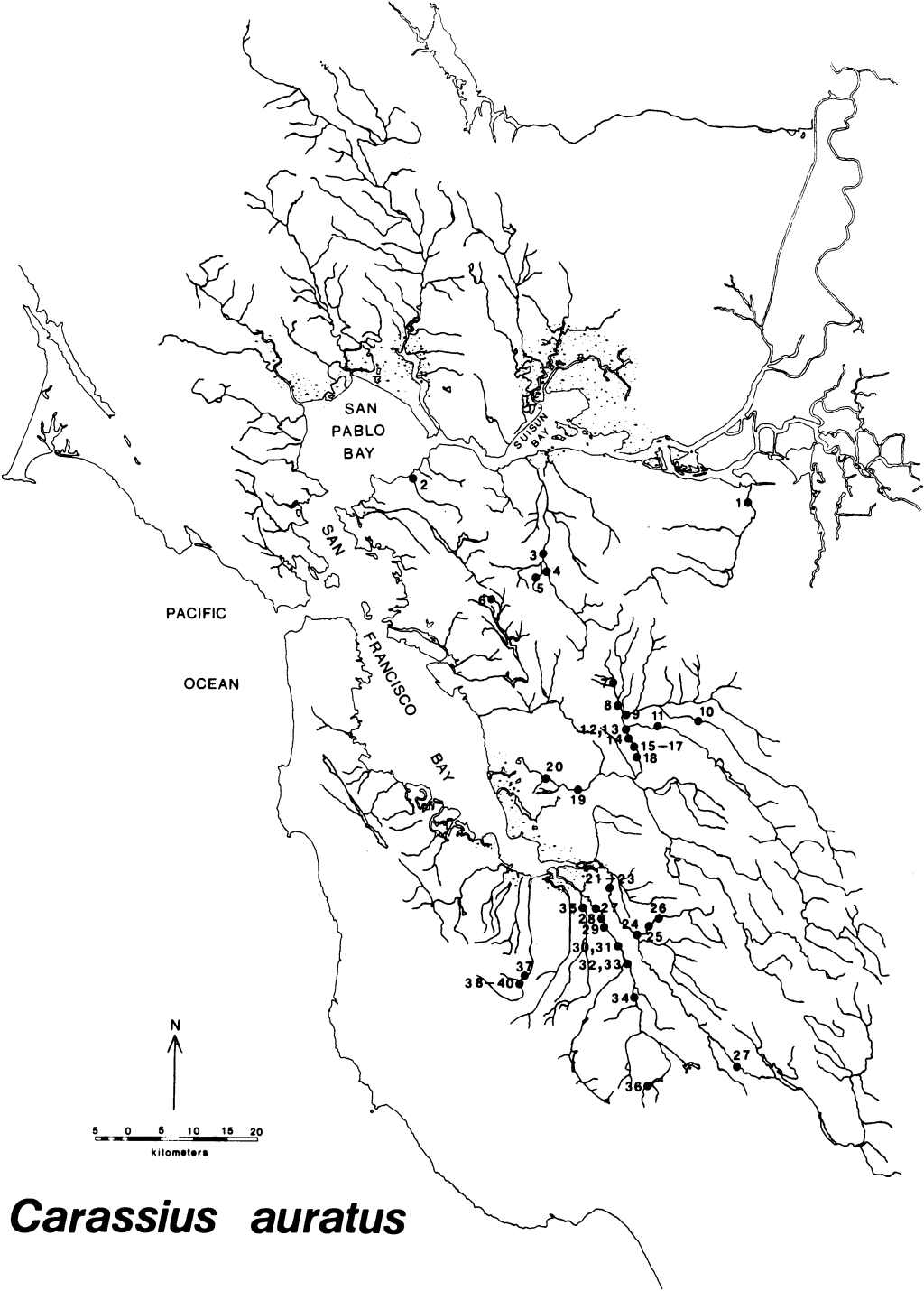


Fig. 7



Carassius auratus

Fig. 8

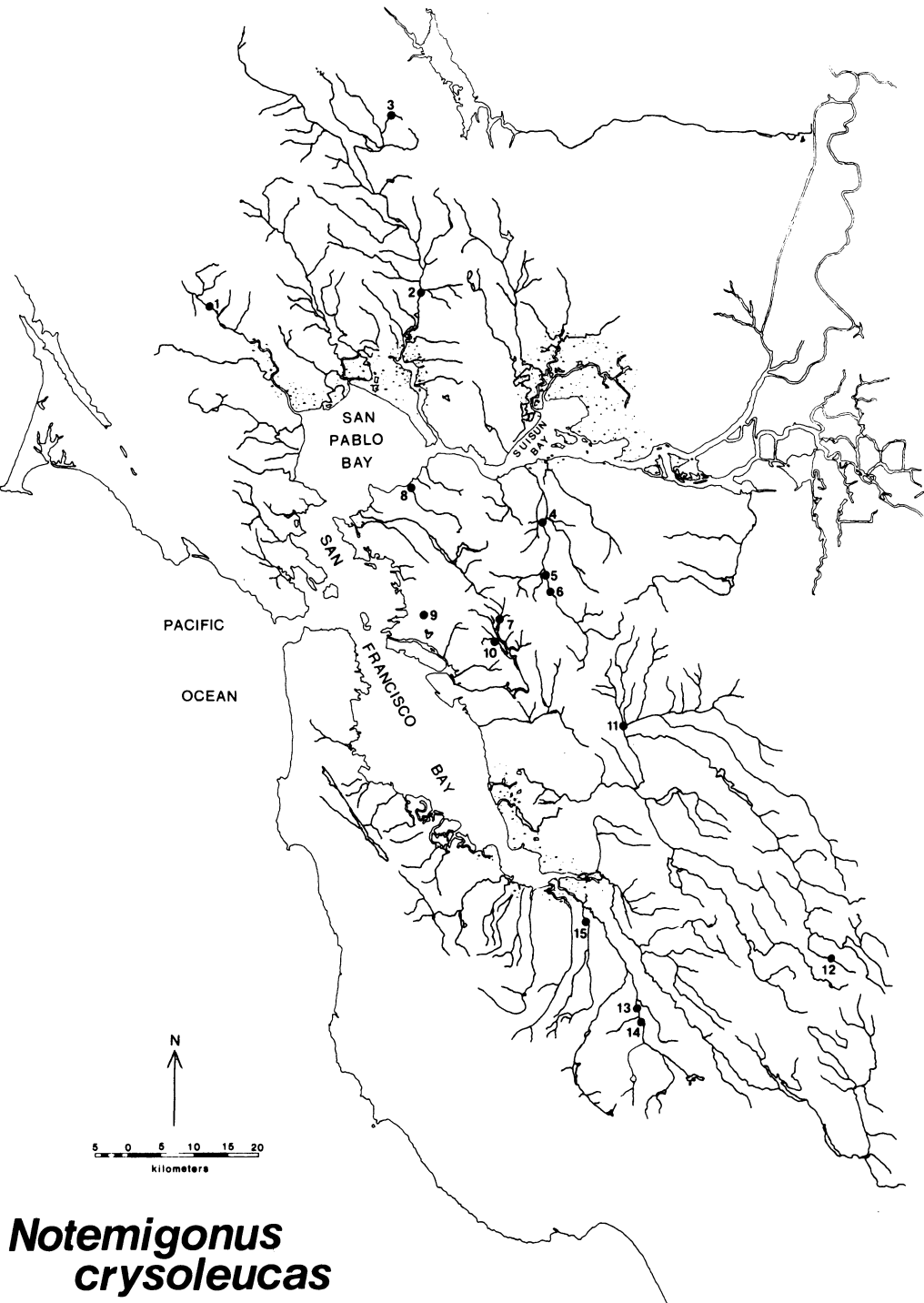


Fig. 9

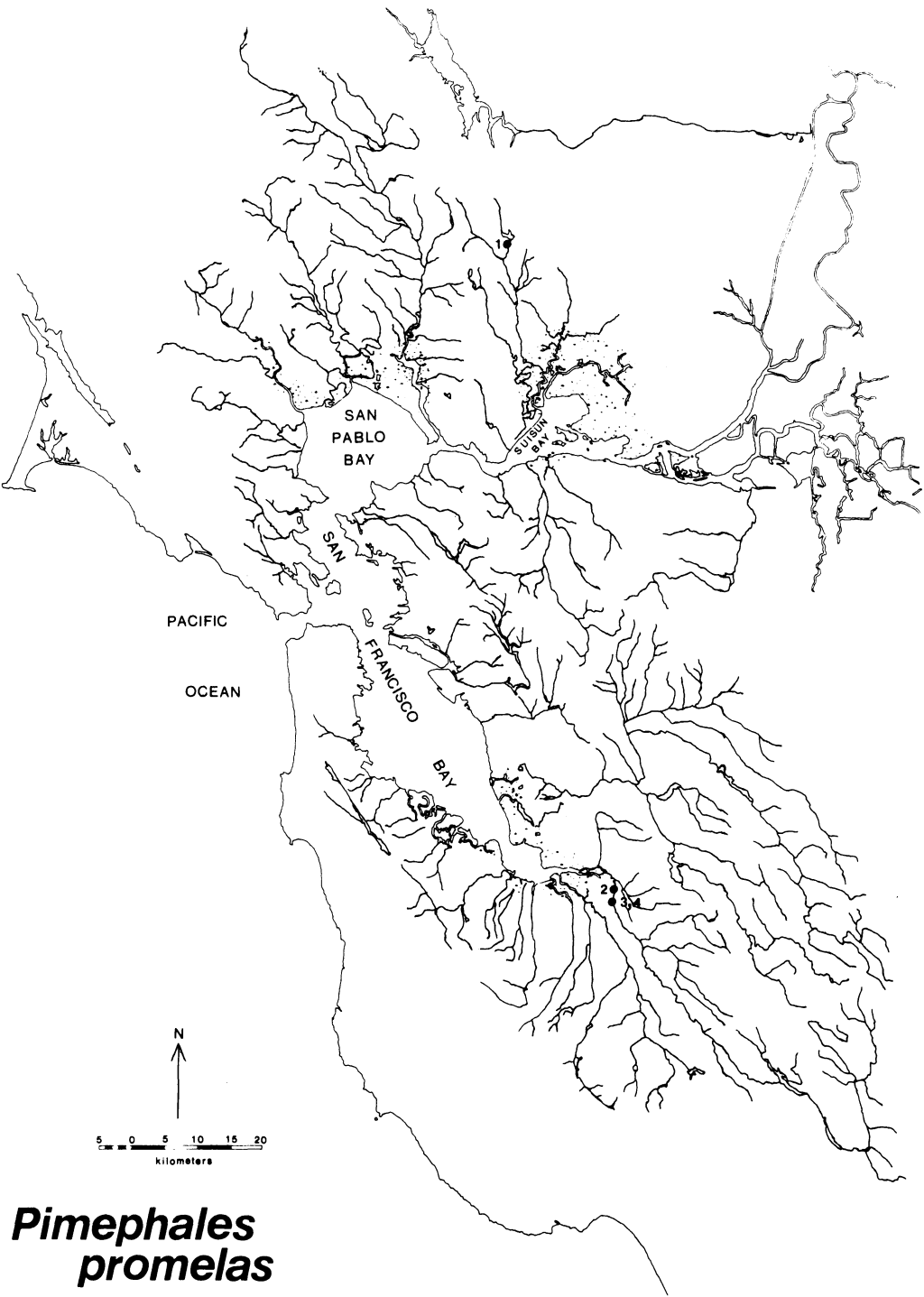


Fig. 10

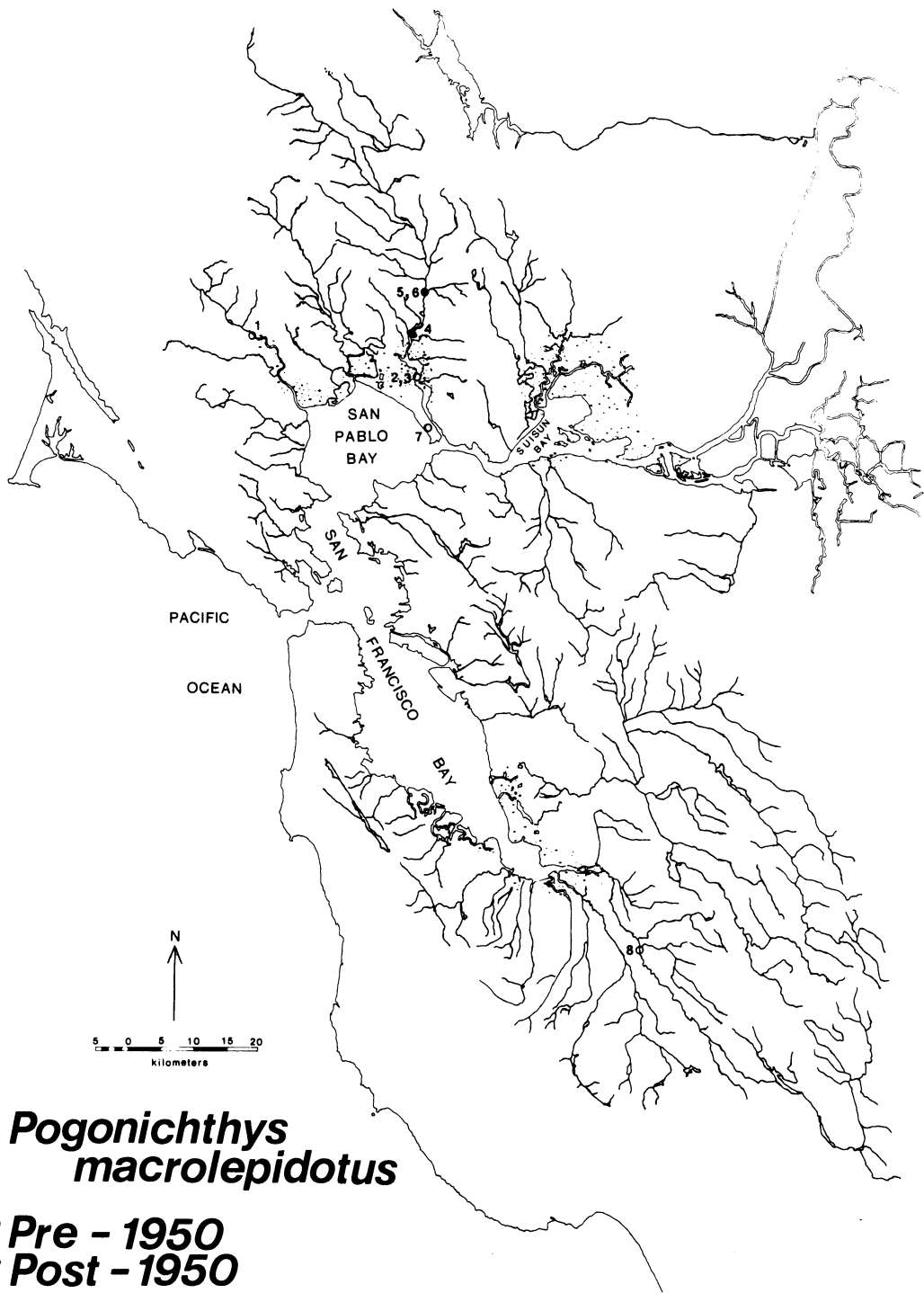
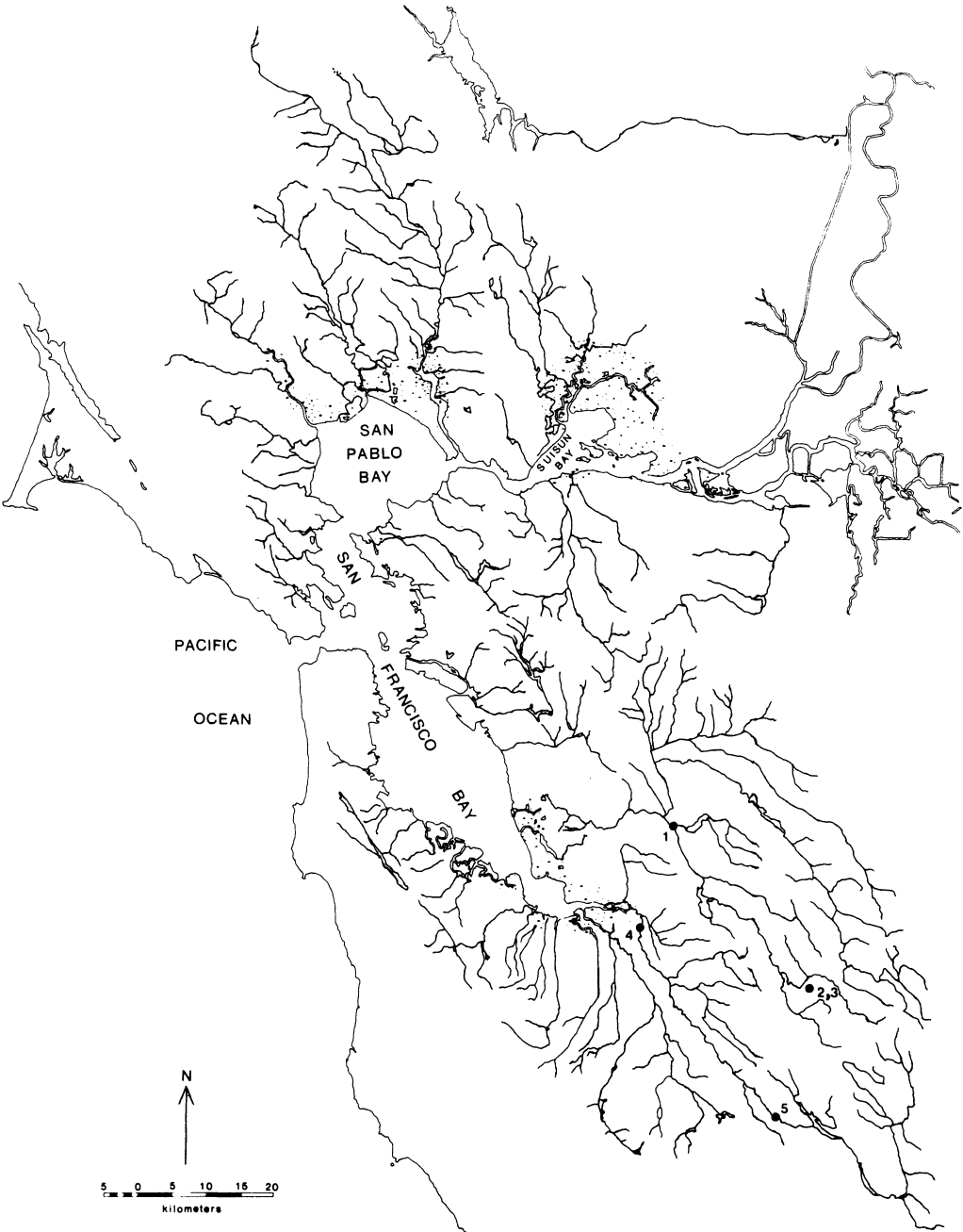


Fig. 11



Rhinichthys osculus

Fig. 12

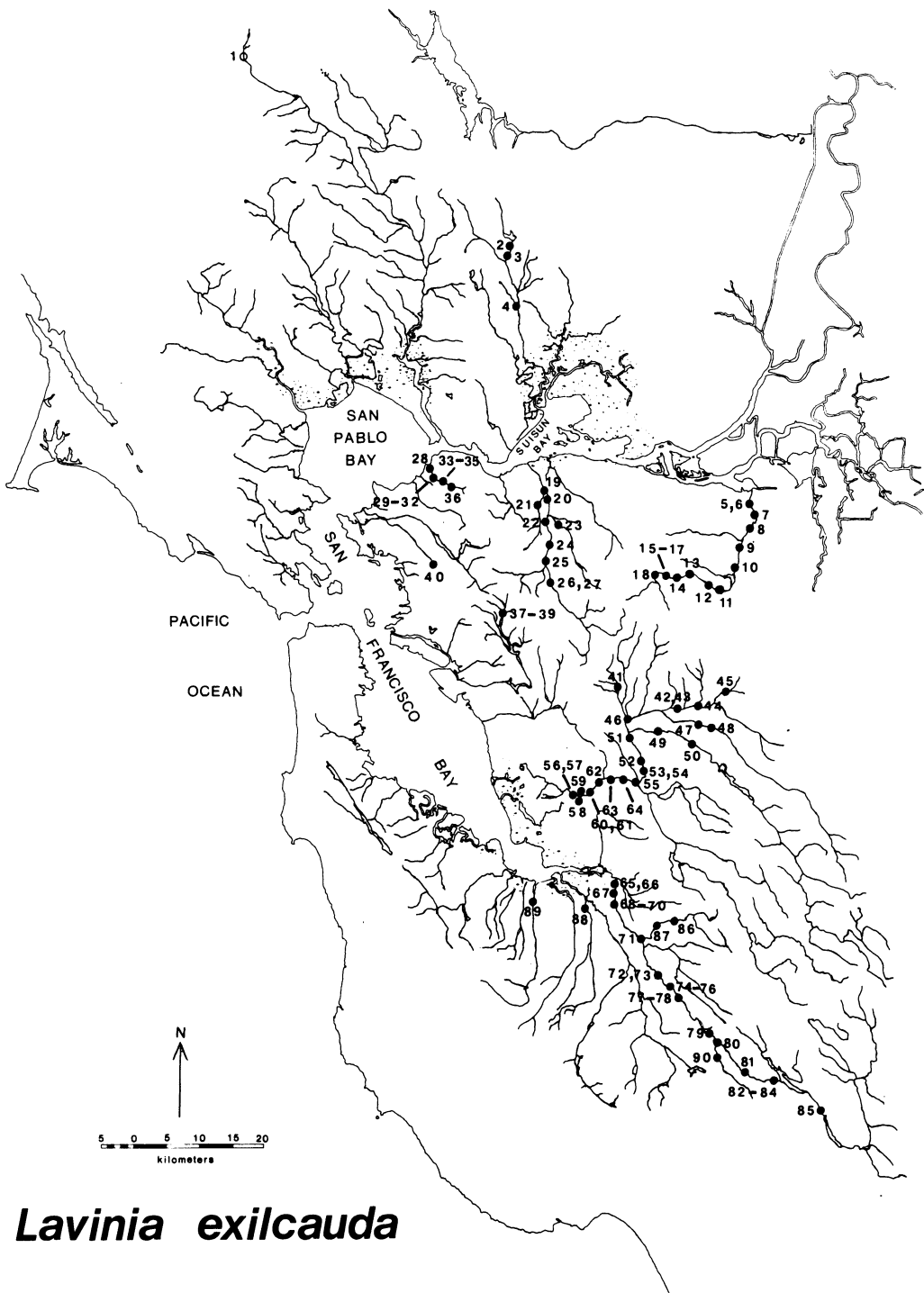


Fig. 13

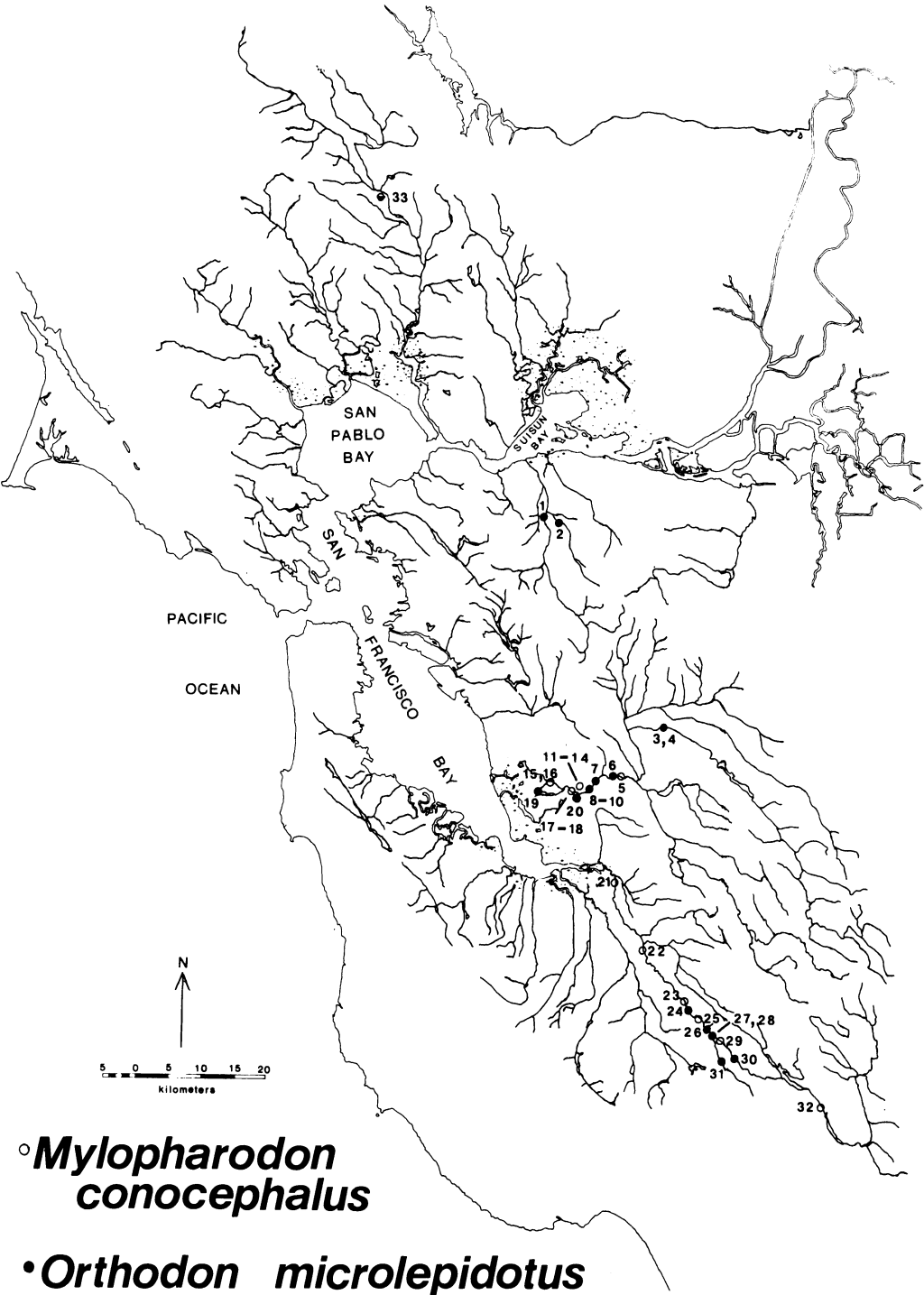


Fig. 14

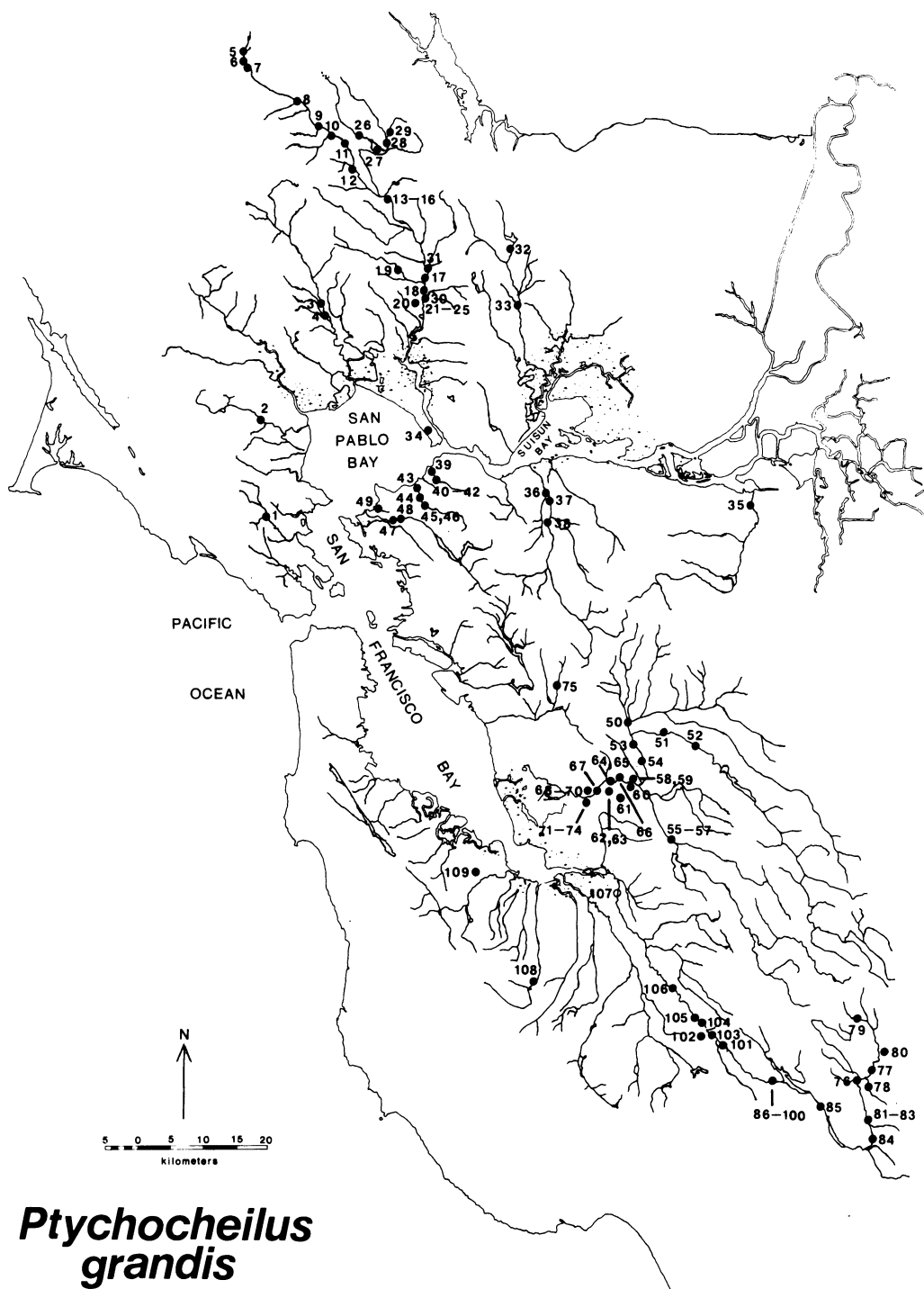


Fig. 15

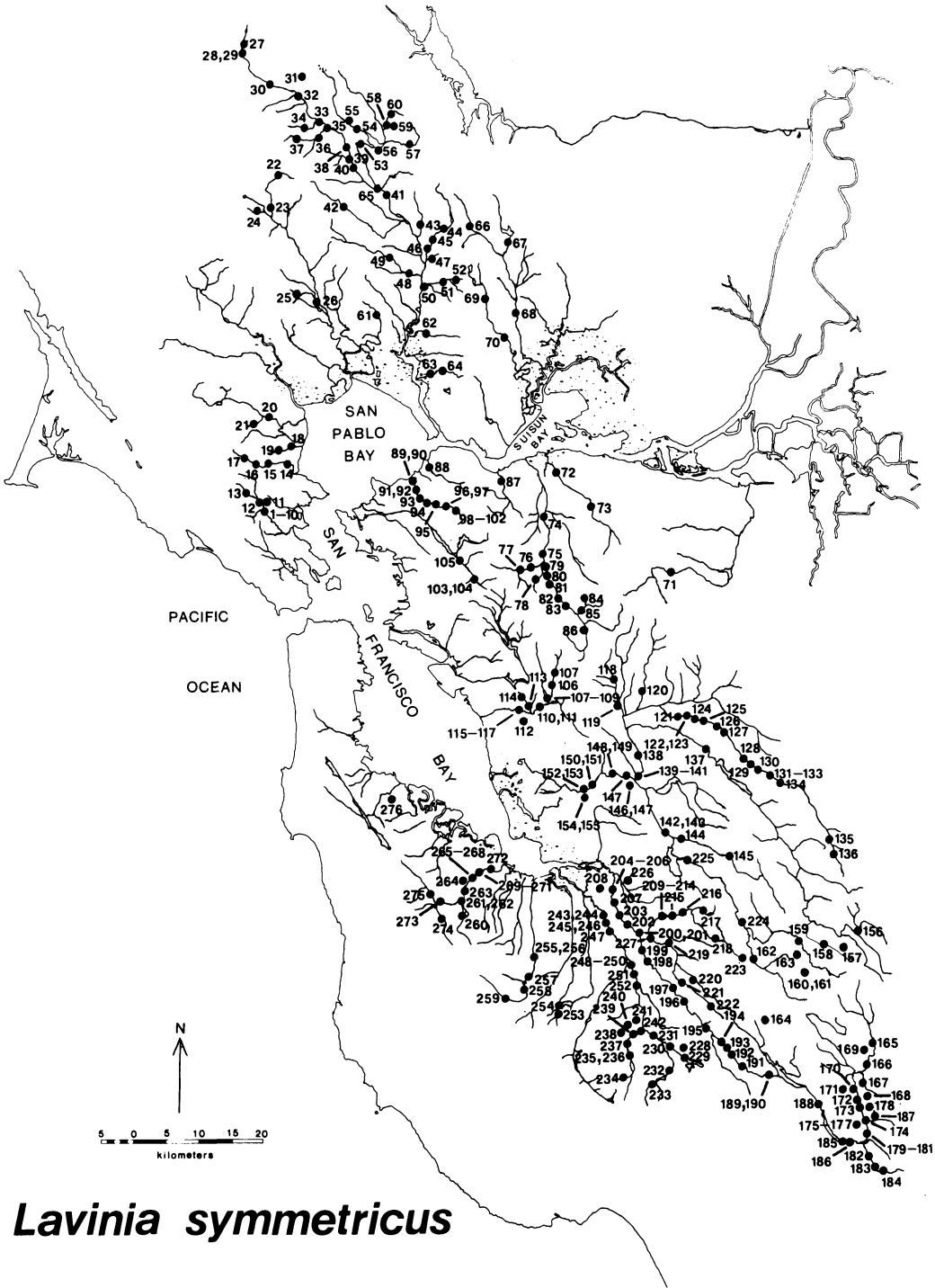


Fig. 16

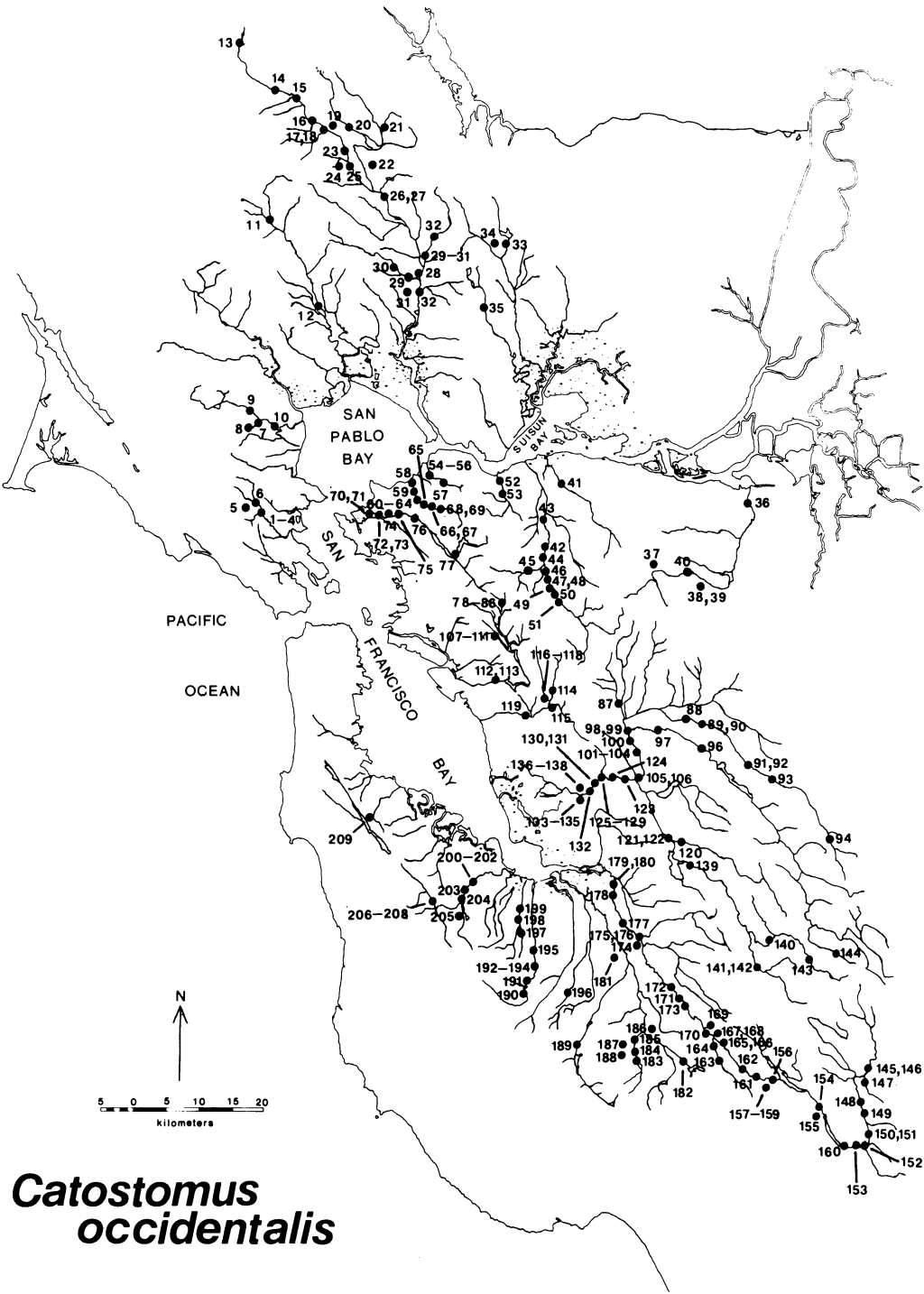
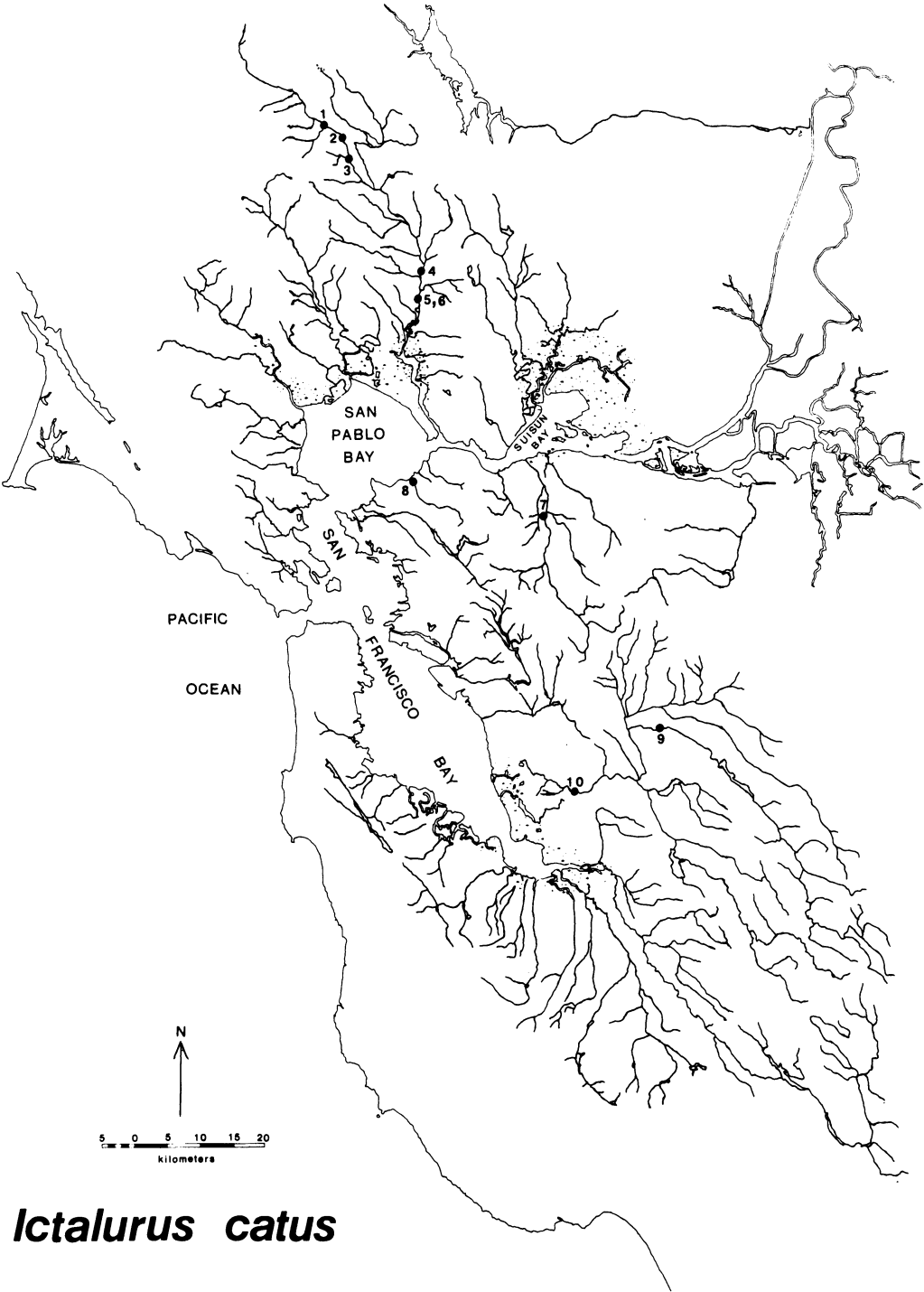
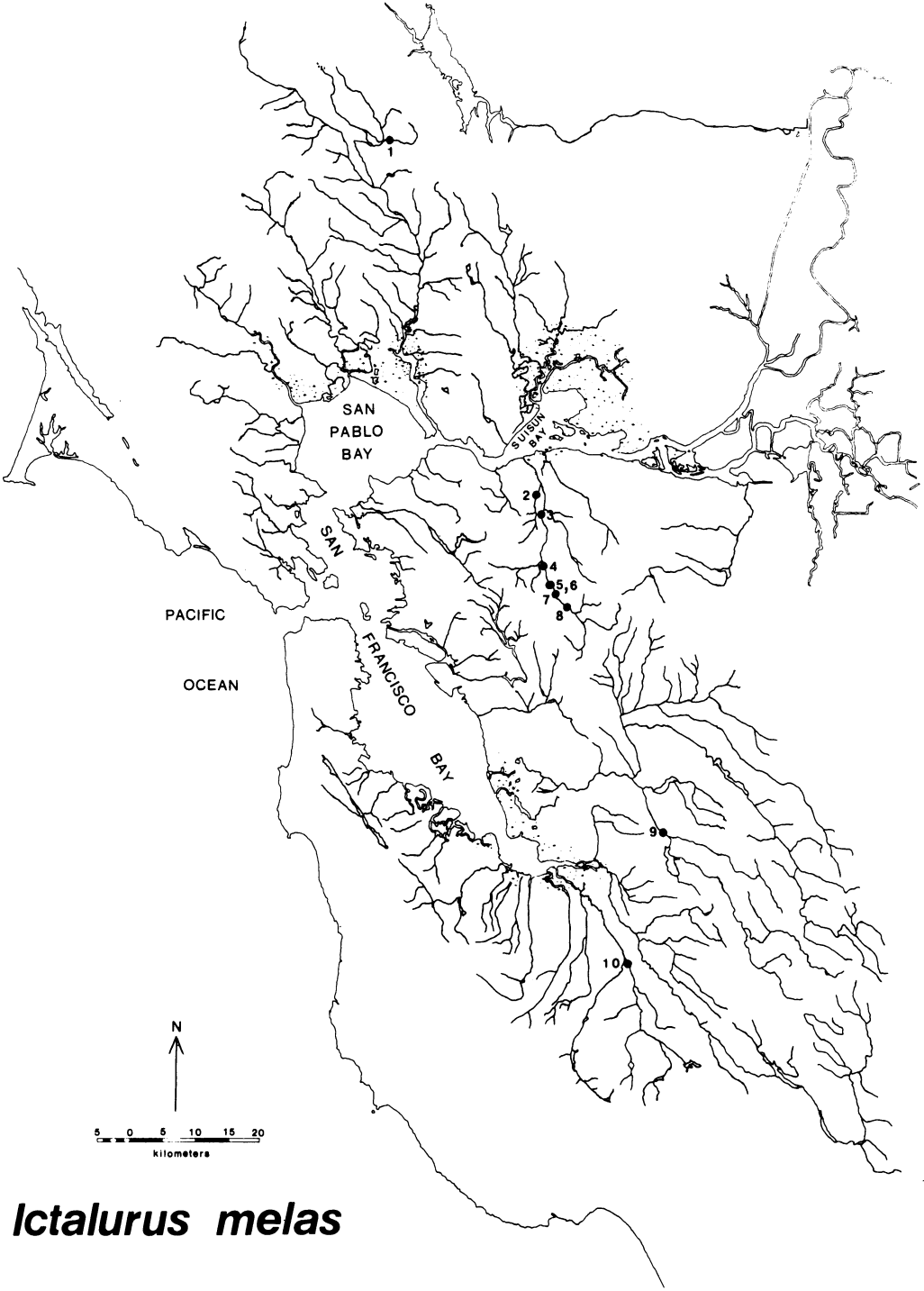


Fig. 17



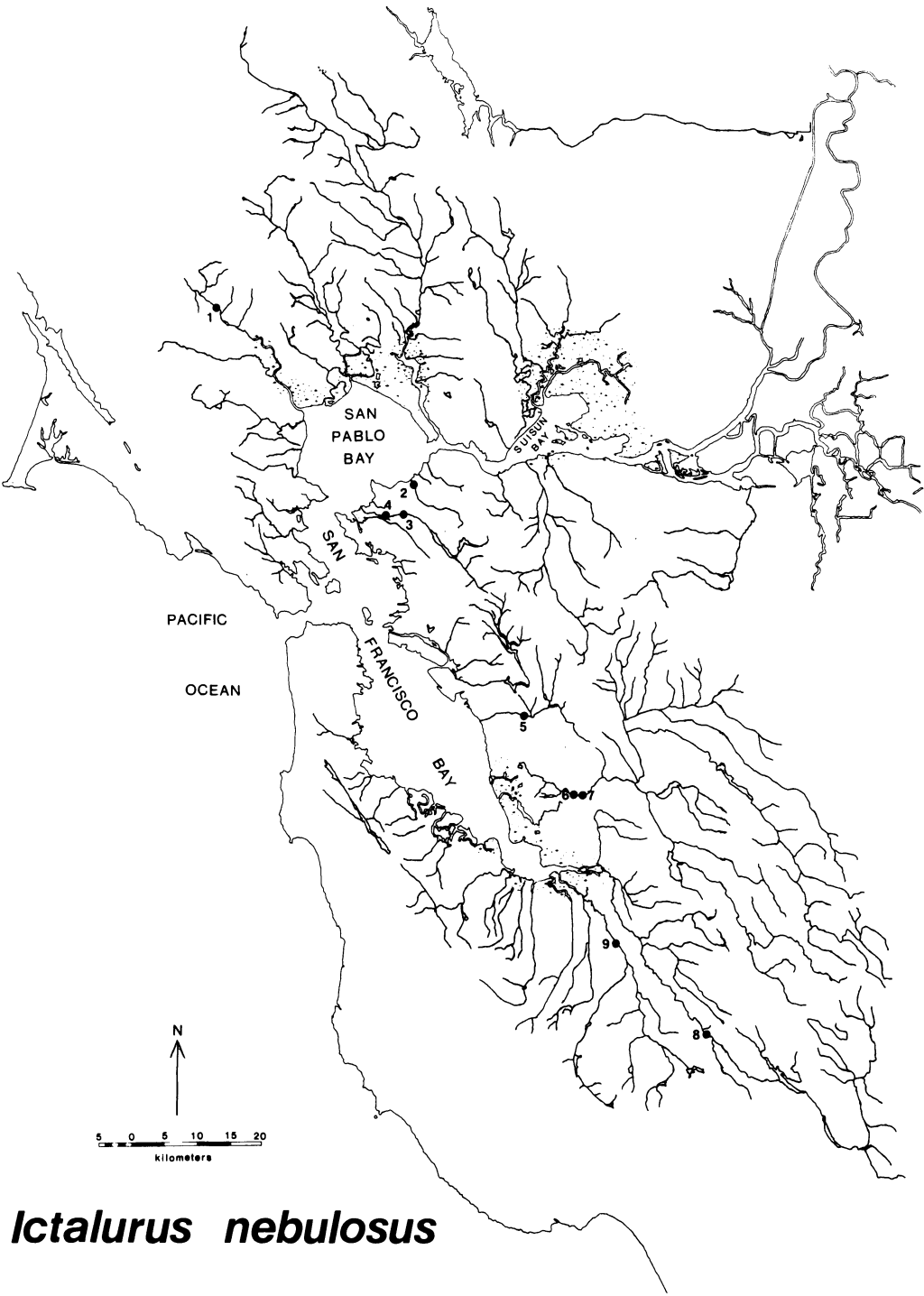
Ictalurus catus

Fig. 18



Ictalurus melas

Fig. 19



Ictalurus nebulosus

Fig. 20

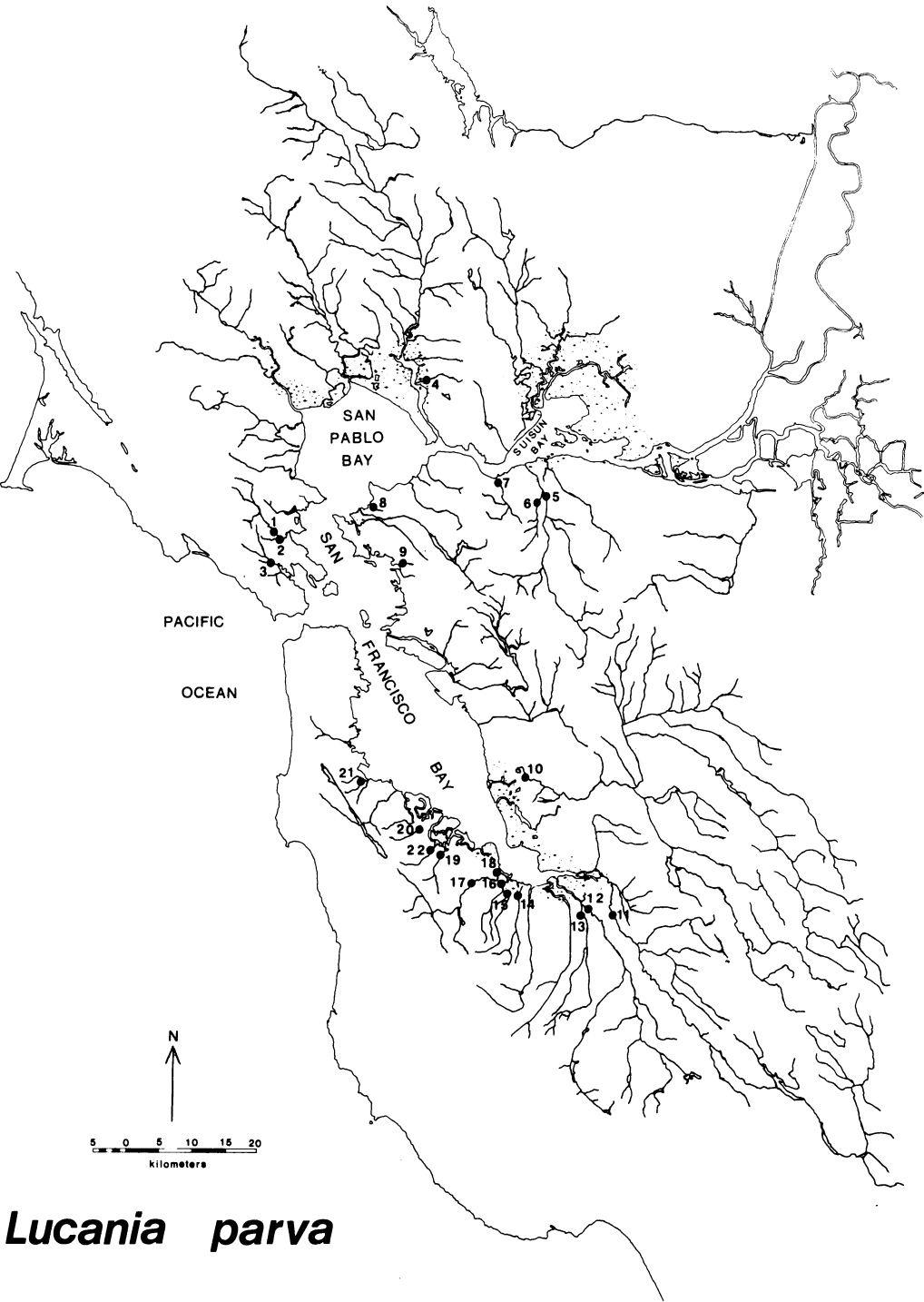
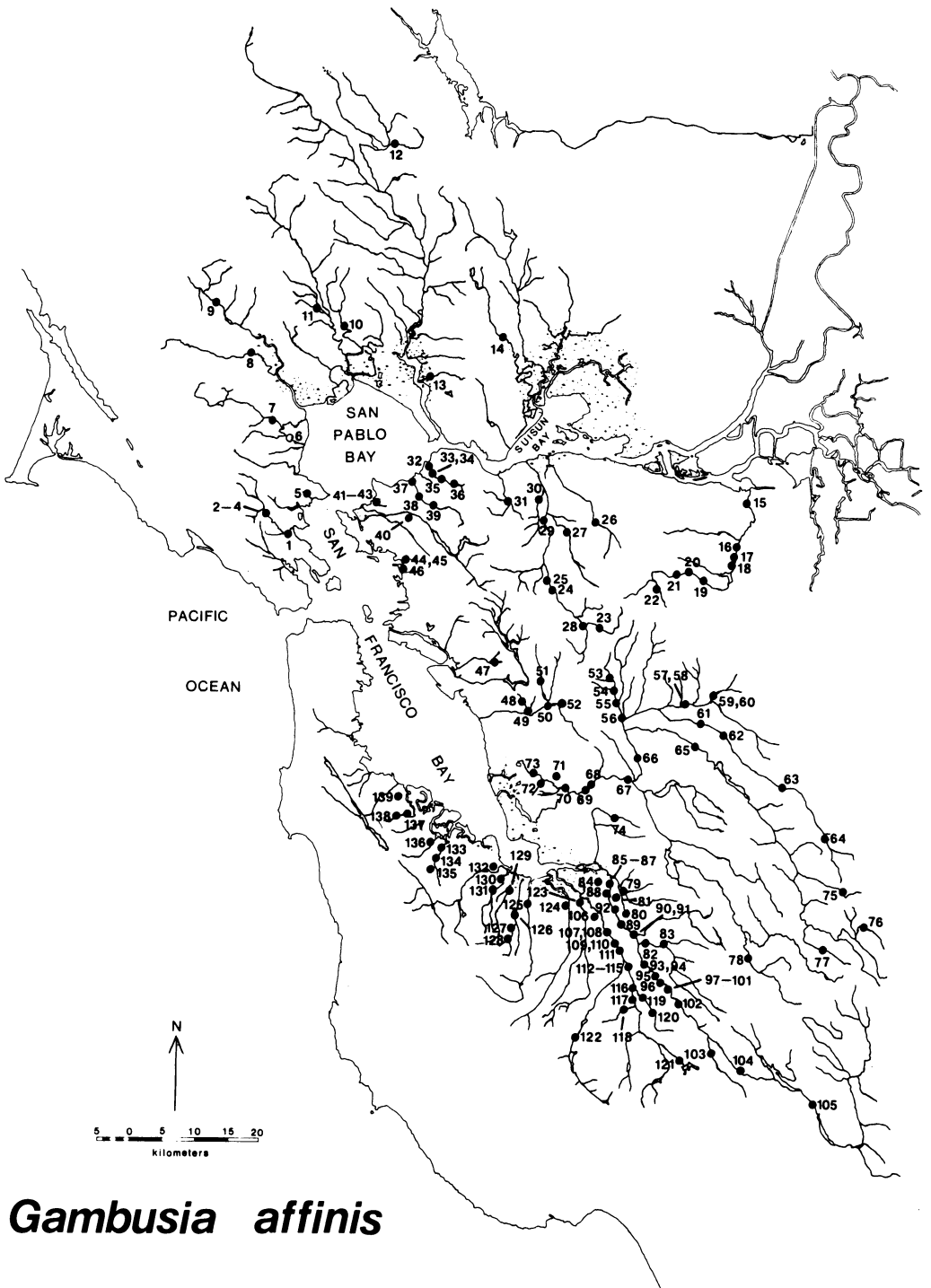


Fig. 21



Gambusia affinis

Fig. 22

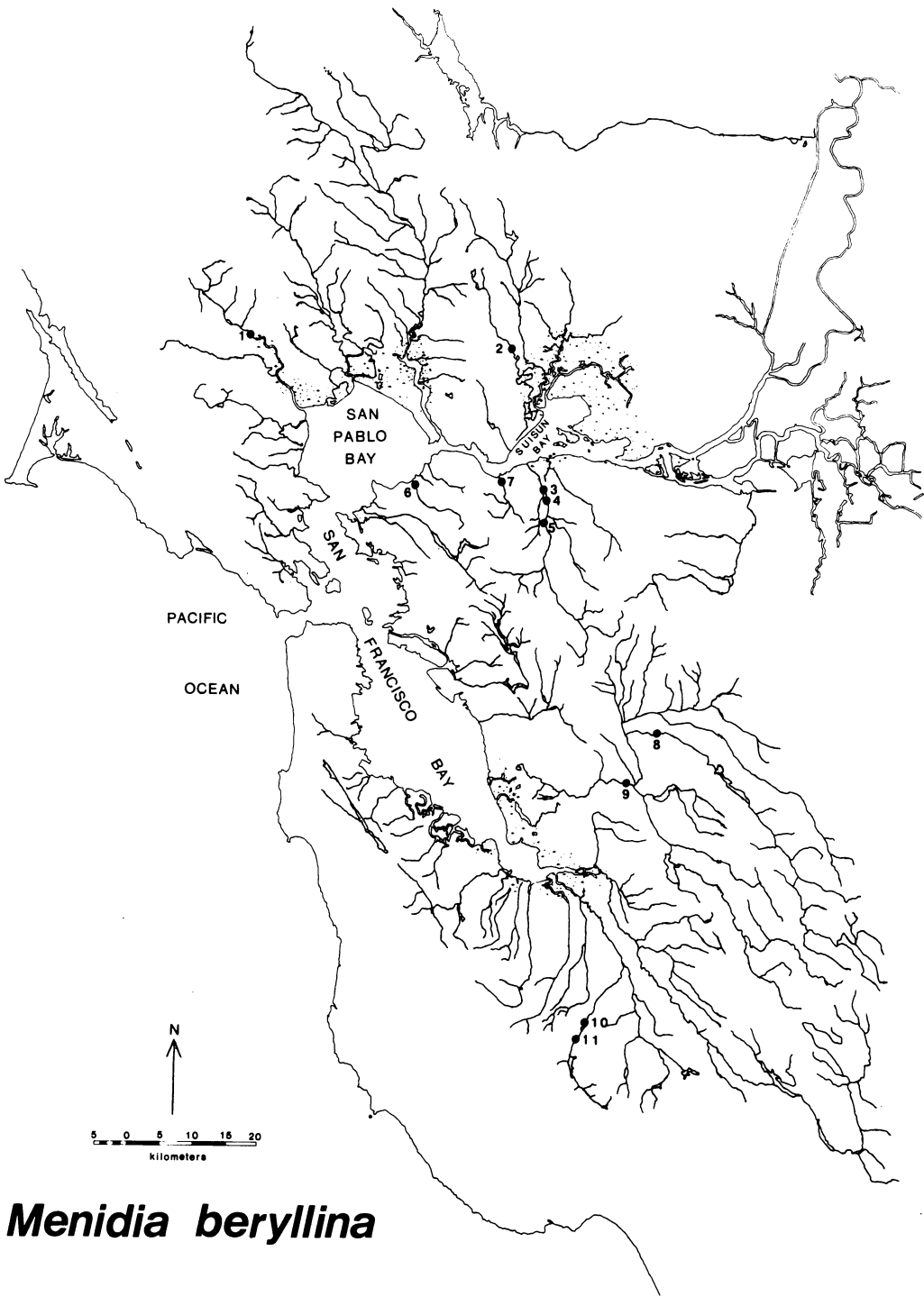


Fig. 23

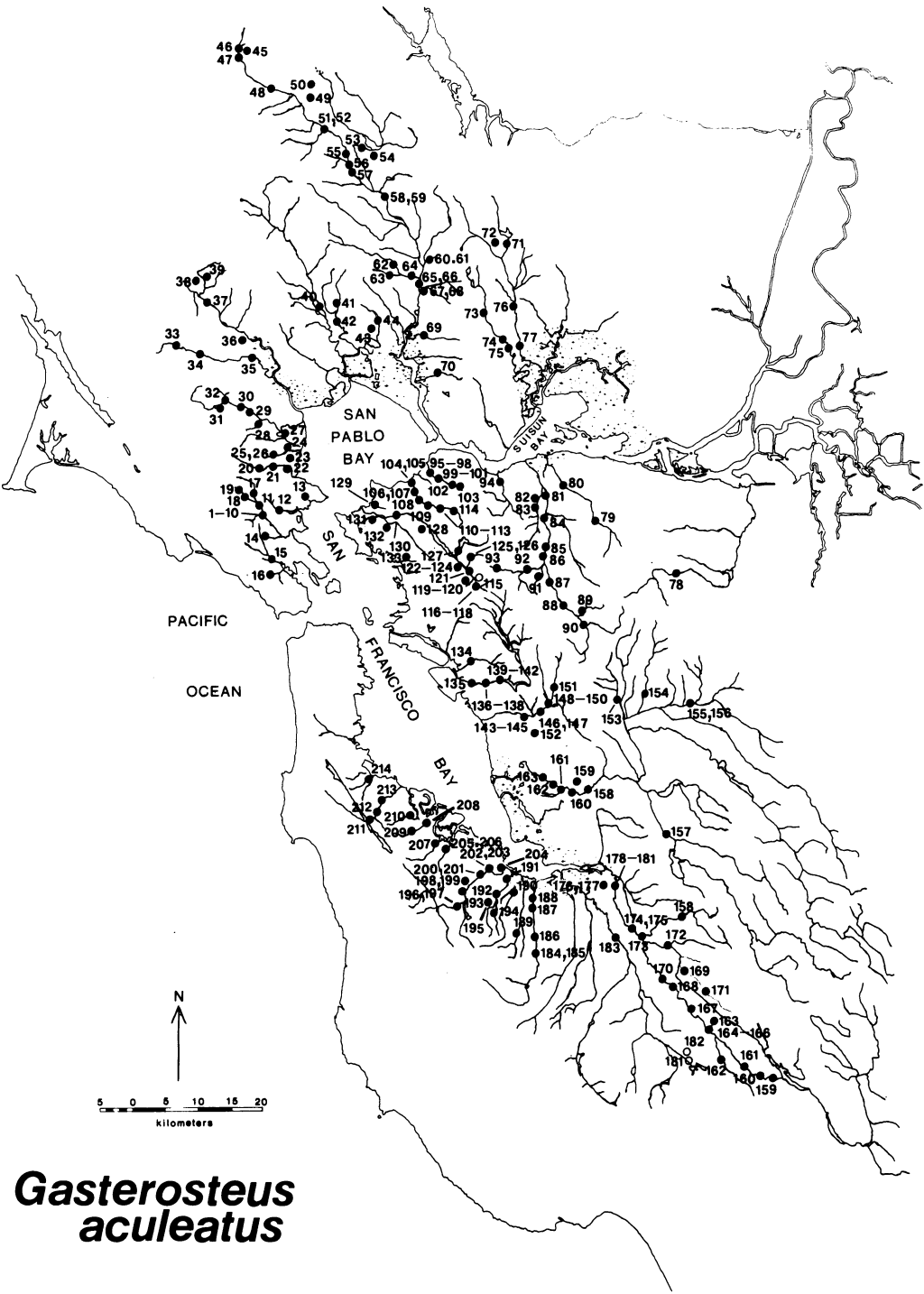


Fig. 24

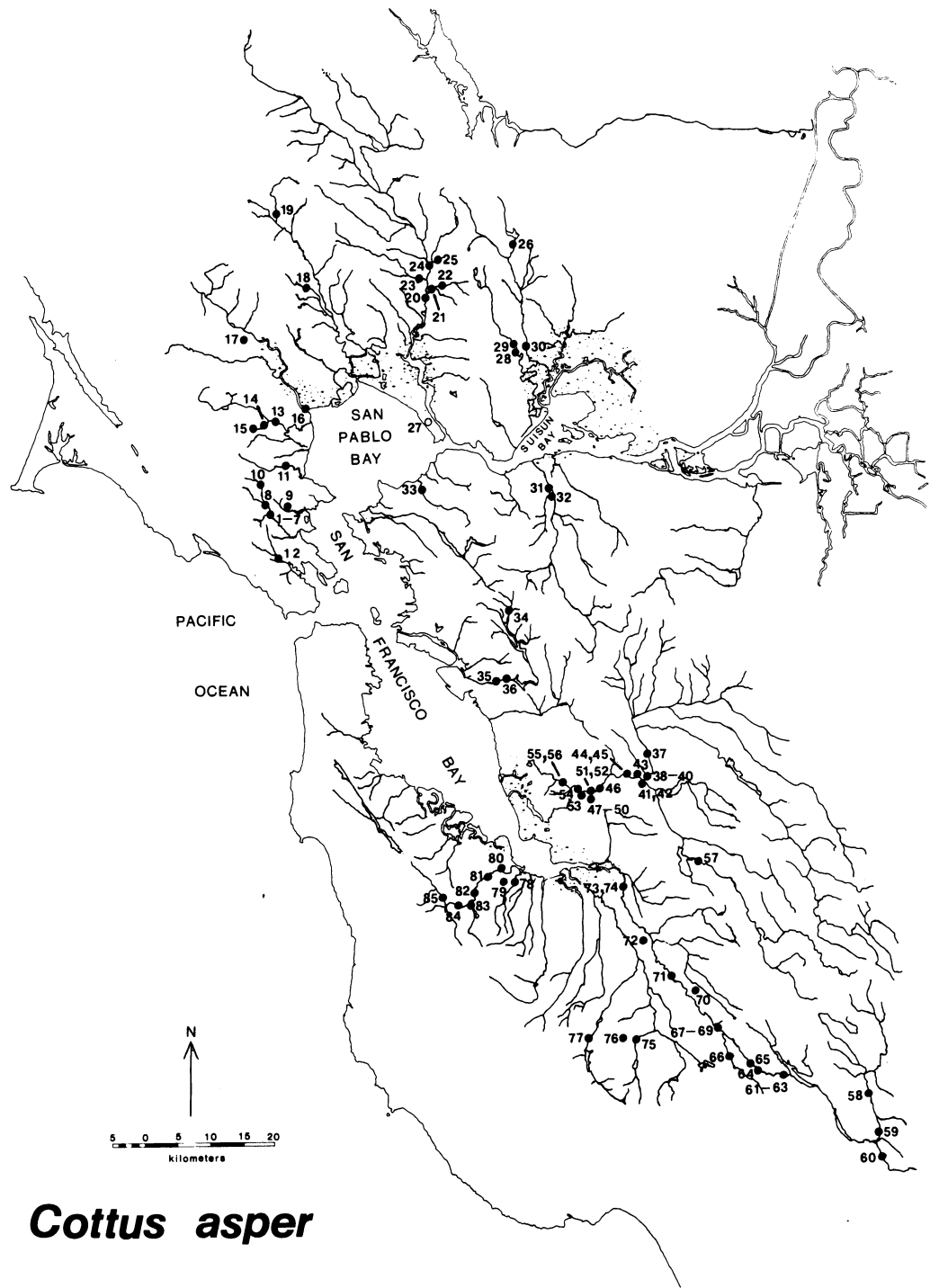
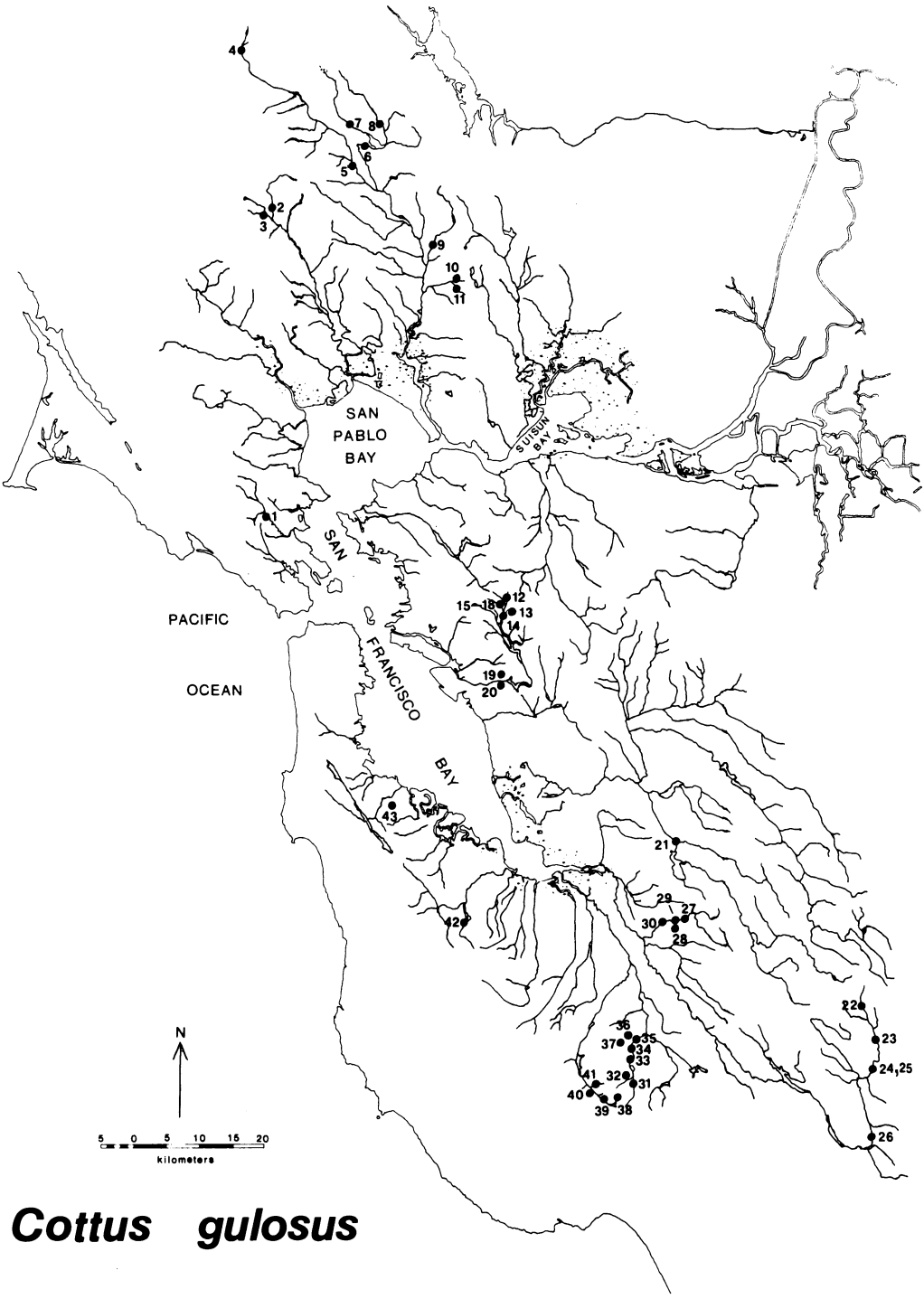


Fig. 25



Cottus gulosus

Fig. 26

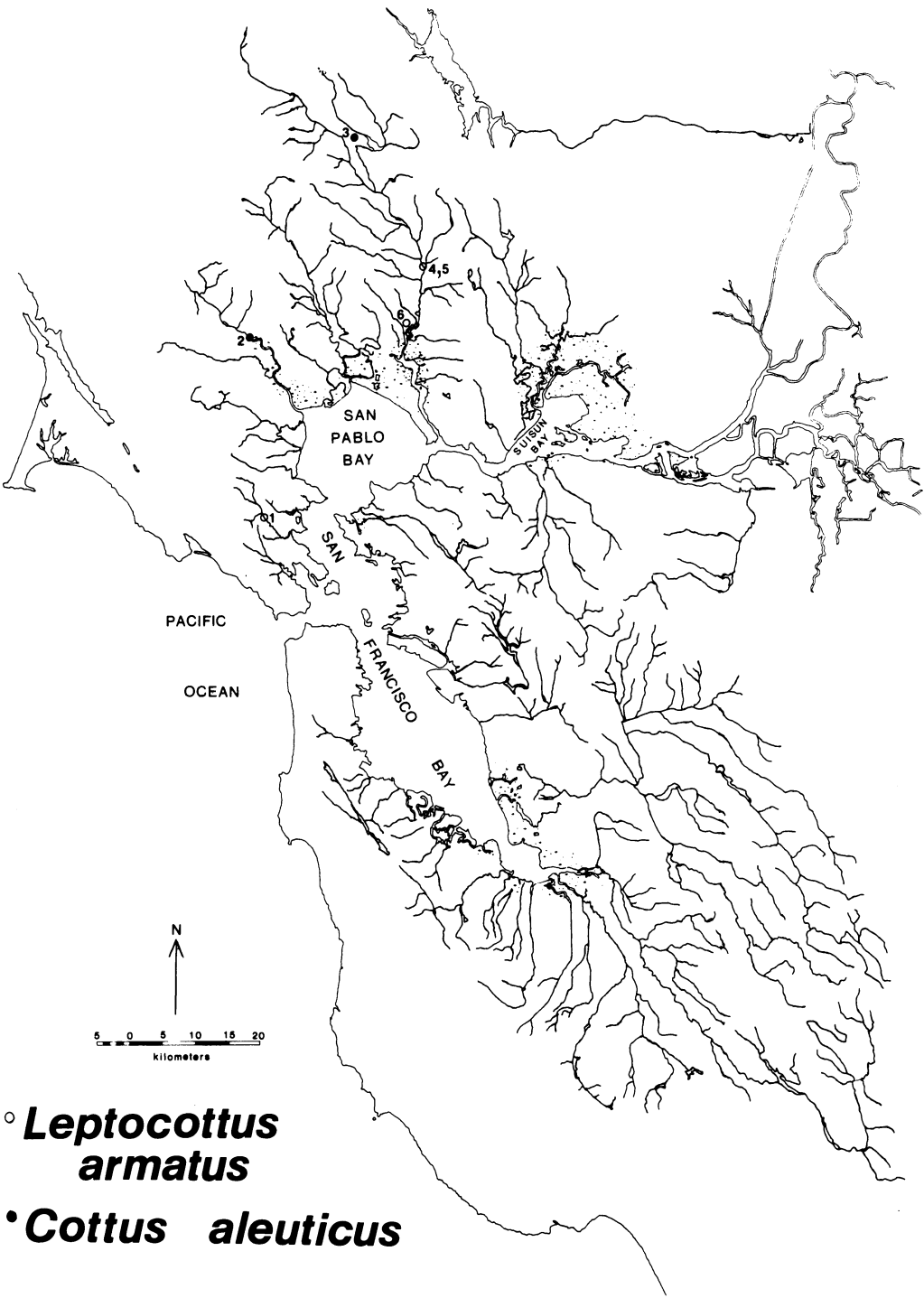


Fig. 27

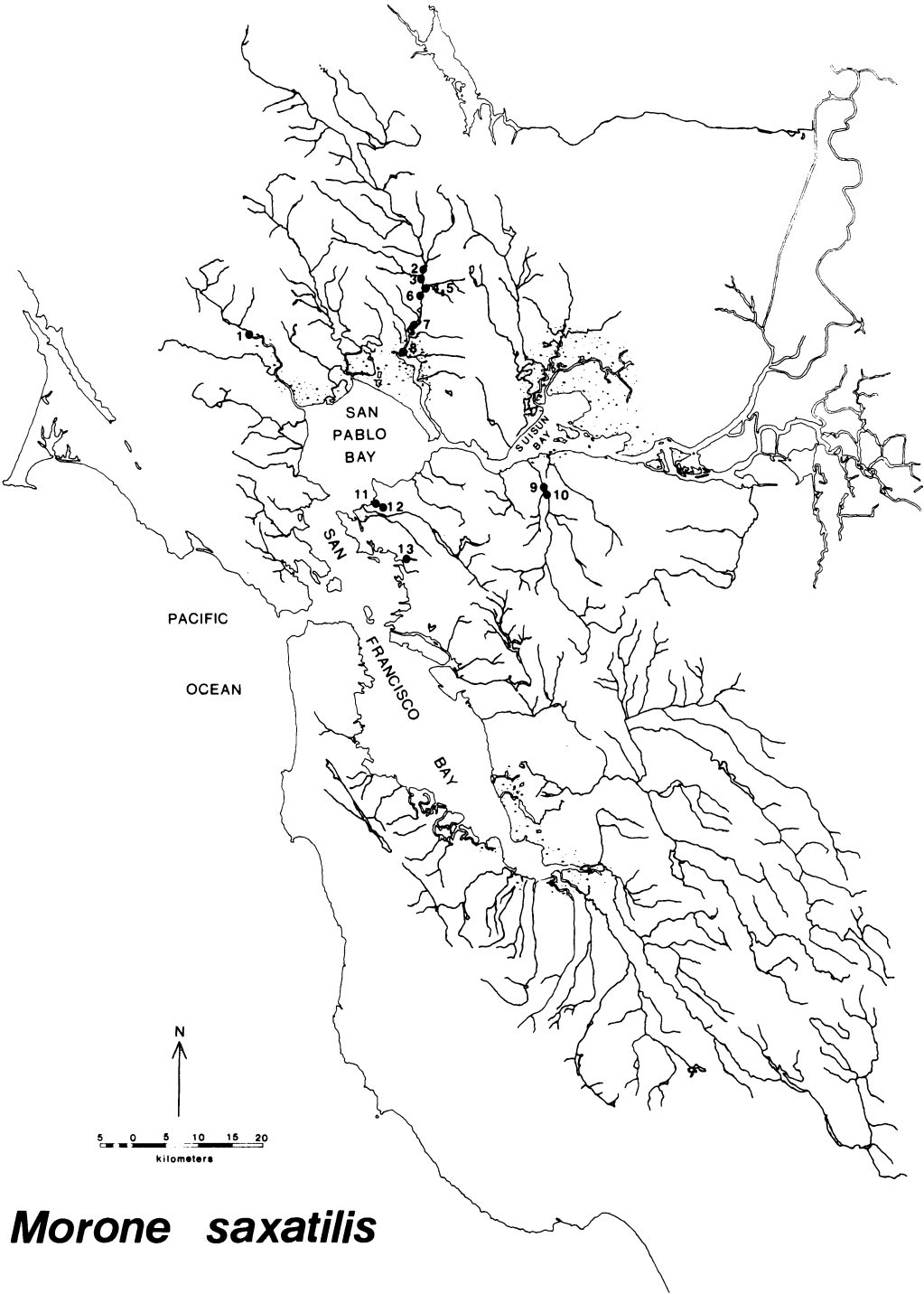


Fig. 28

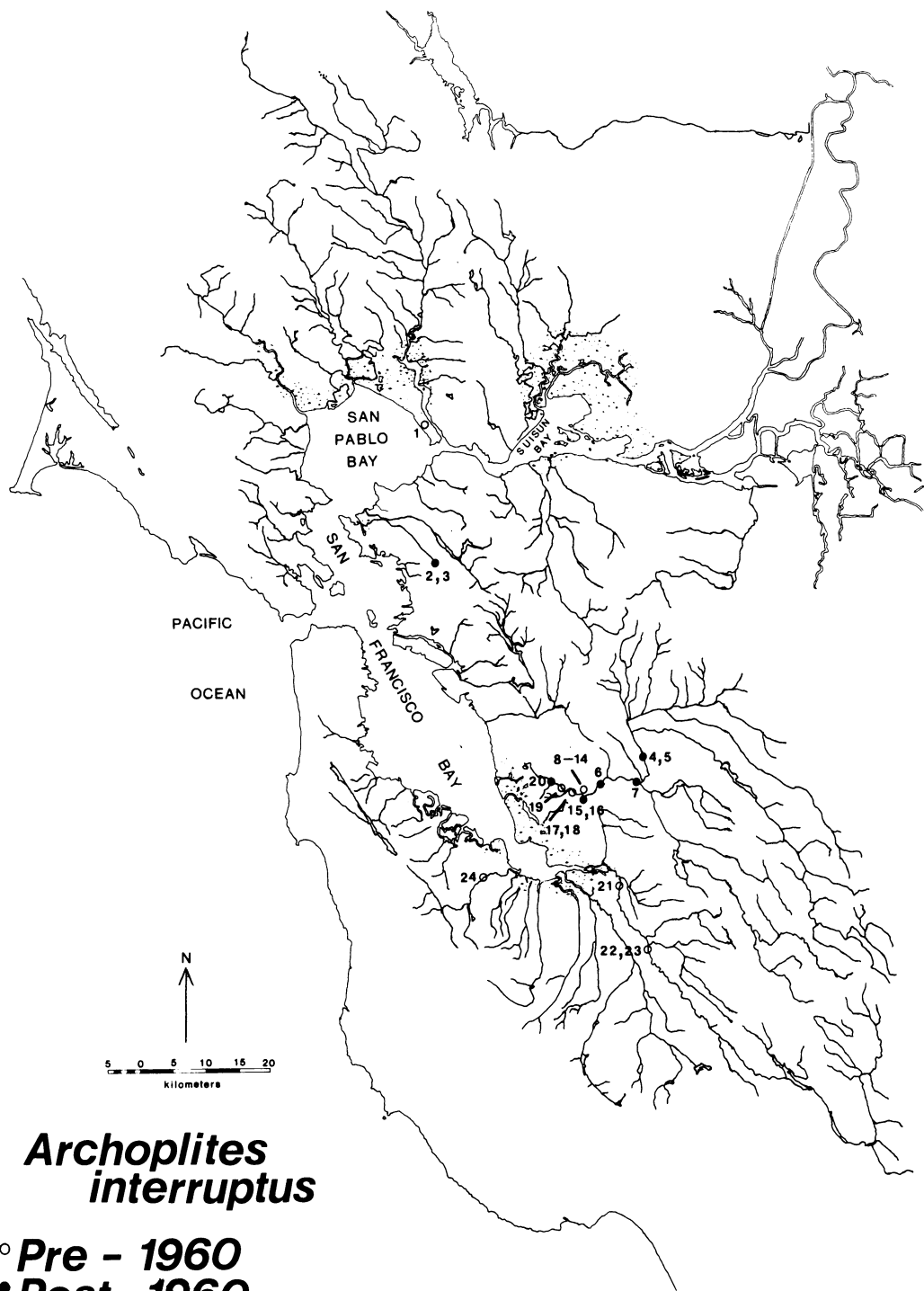


Fig. 29

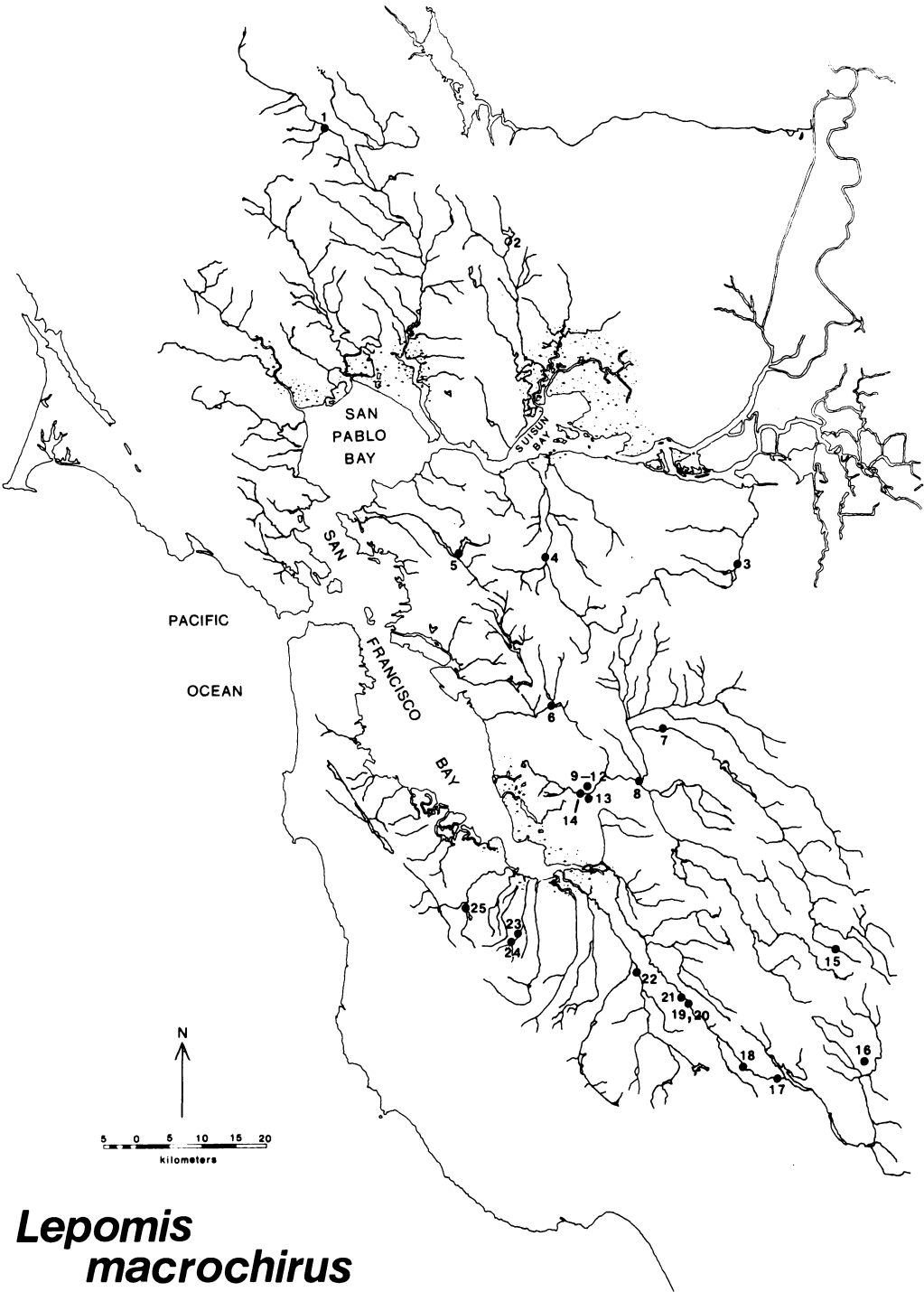


Fig. 30

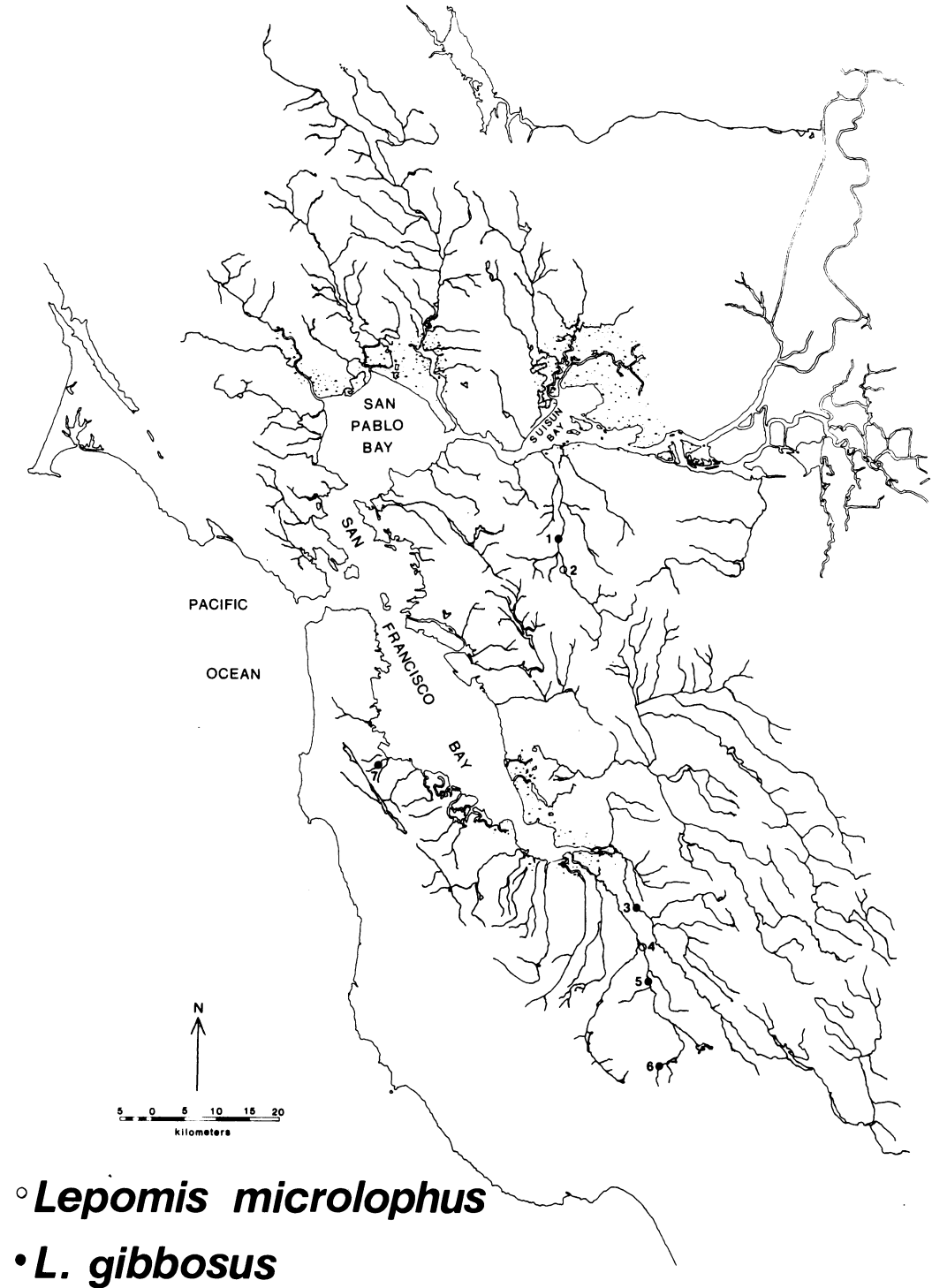


Fig. 31

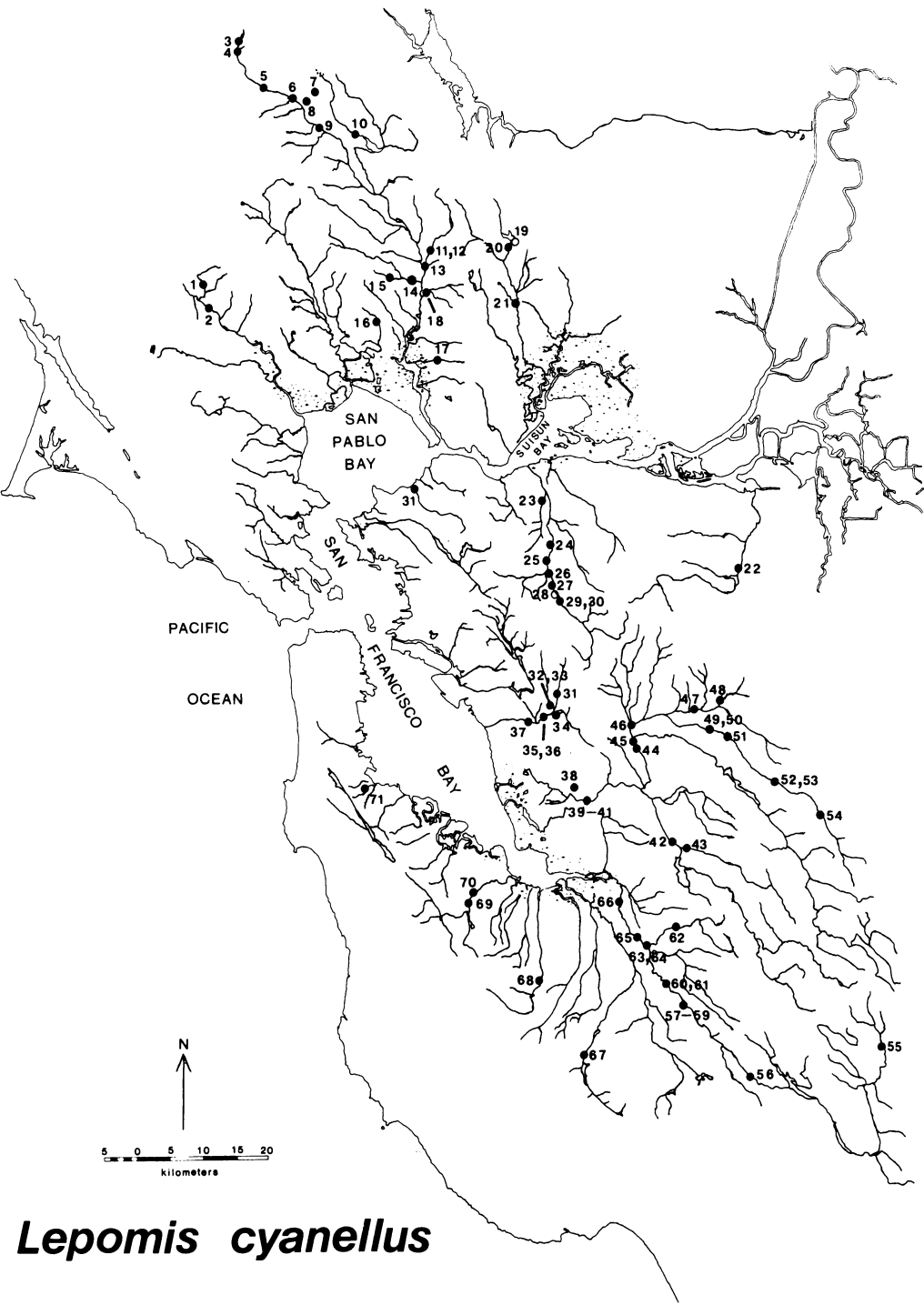


Fig. 32

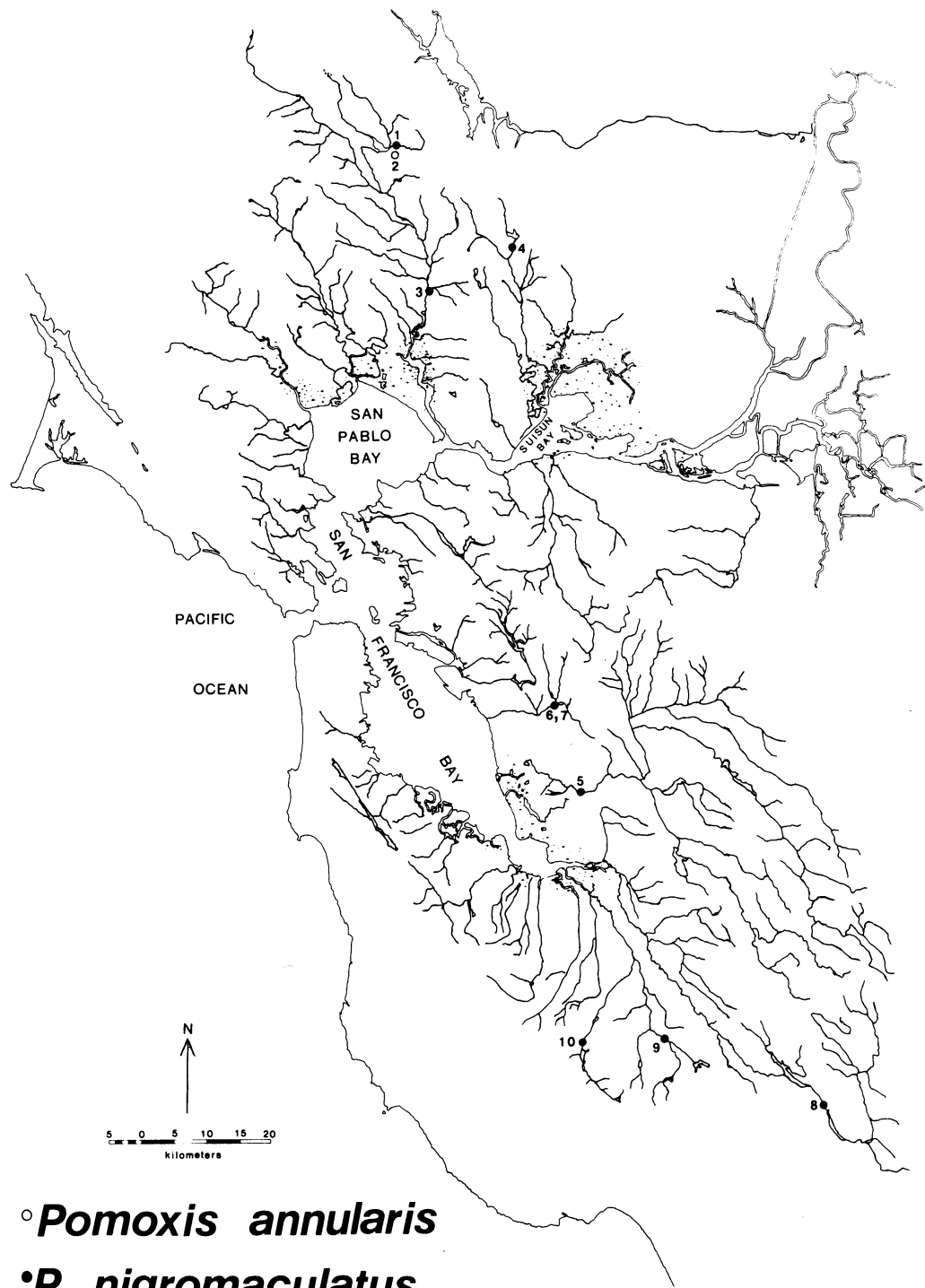


Fig. 33

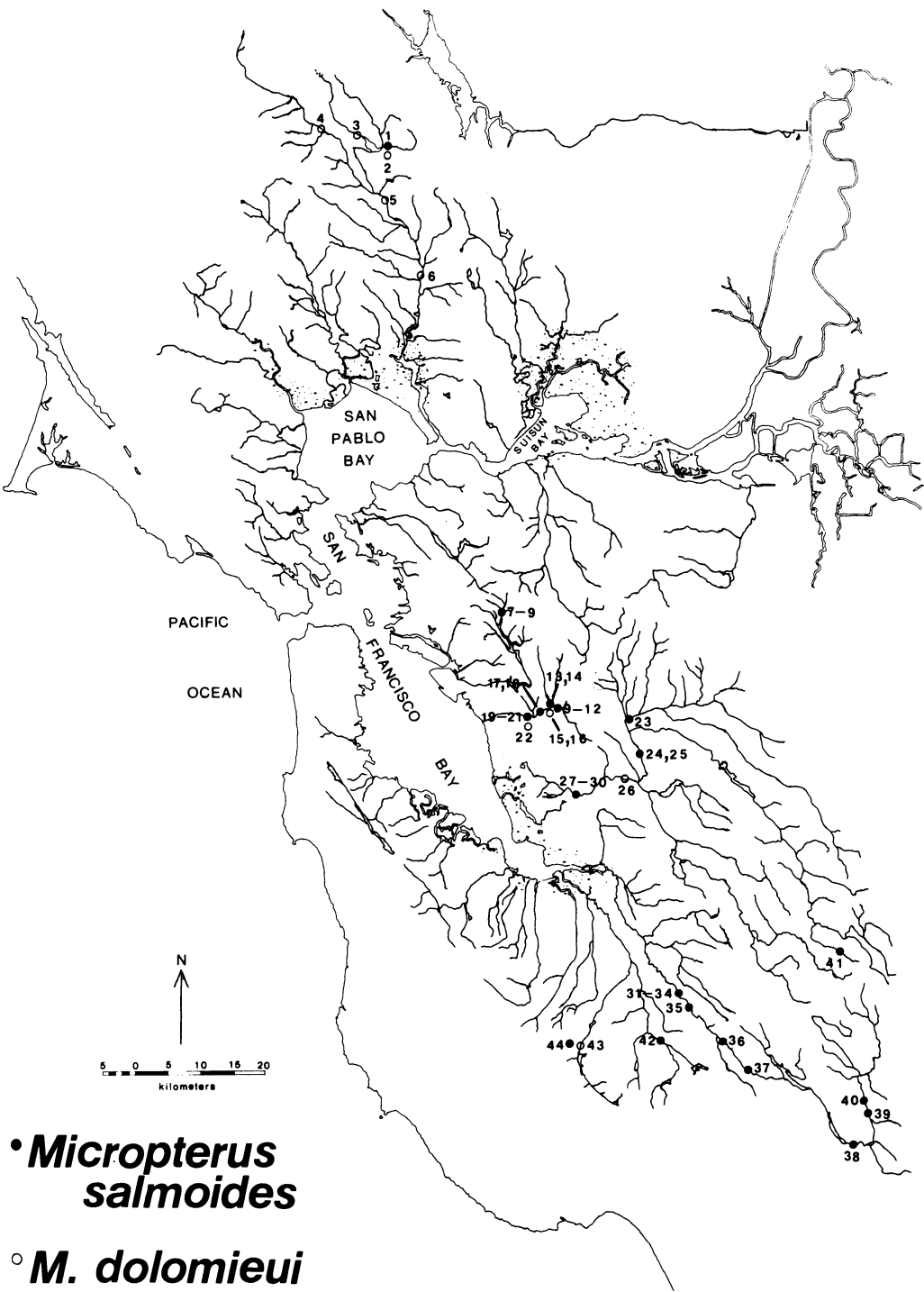


Fig. 34

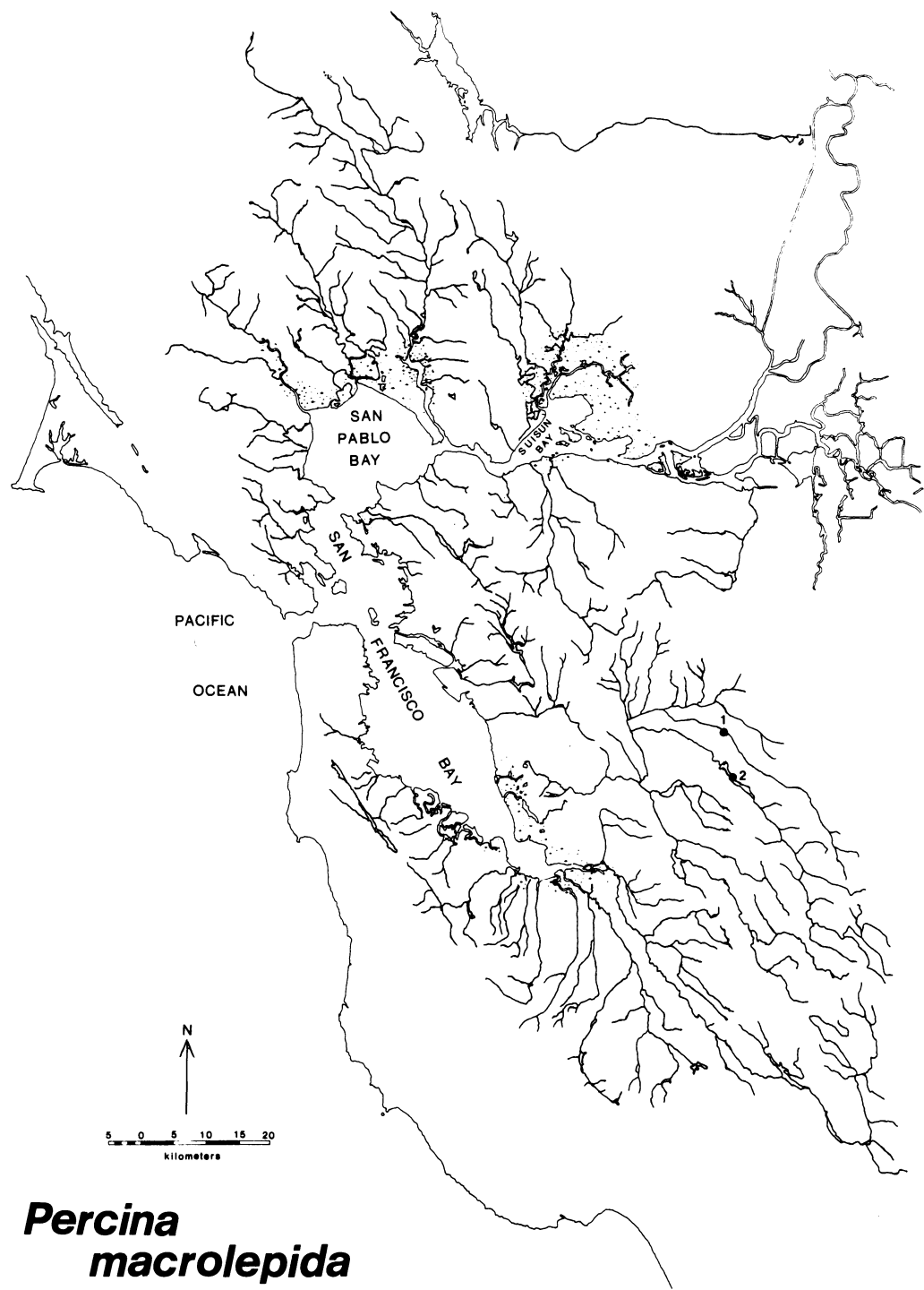


Fig. 35

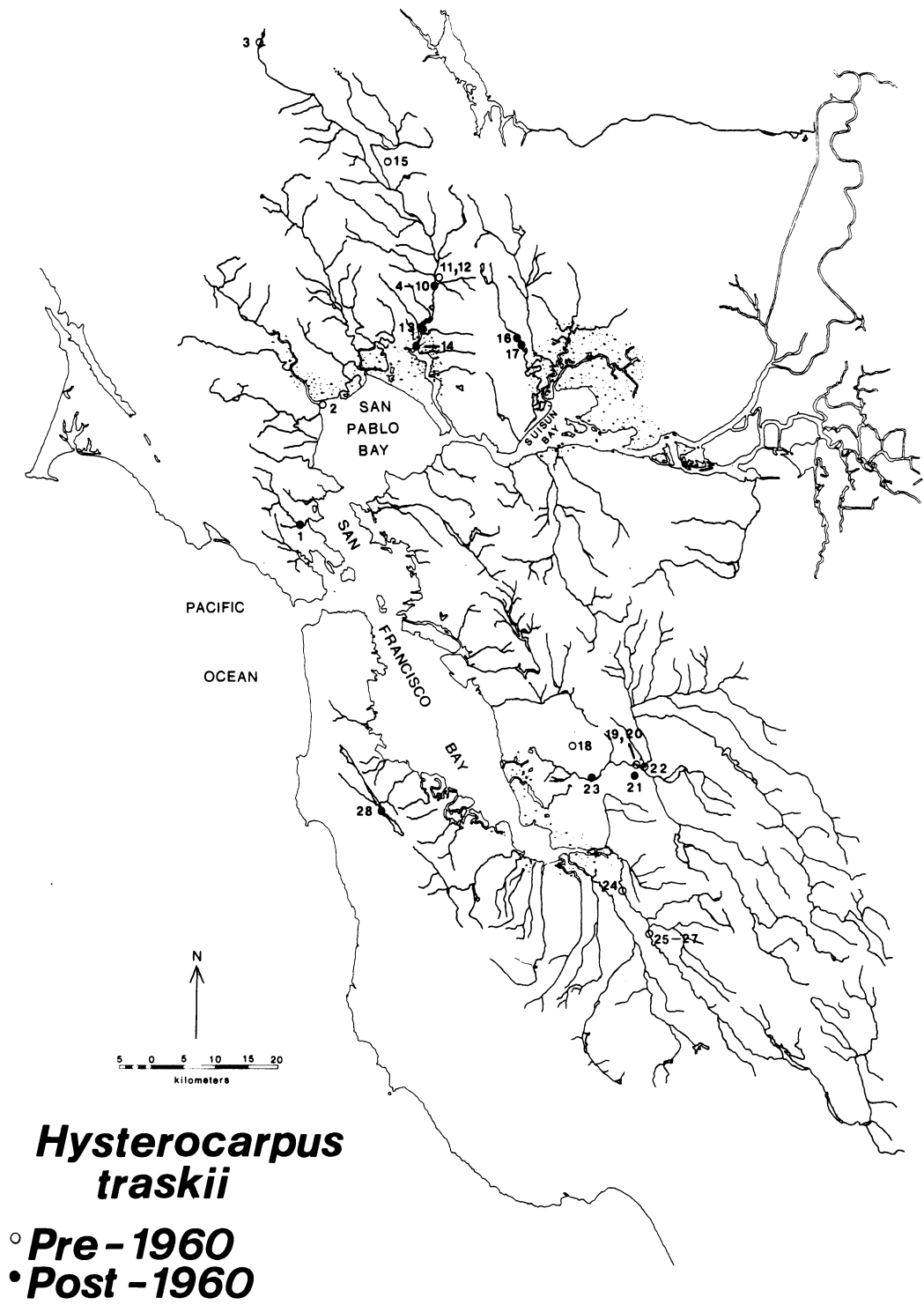
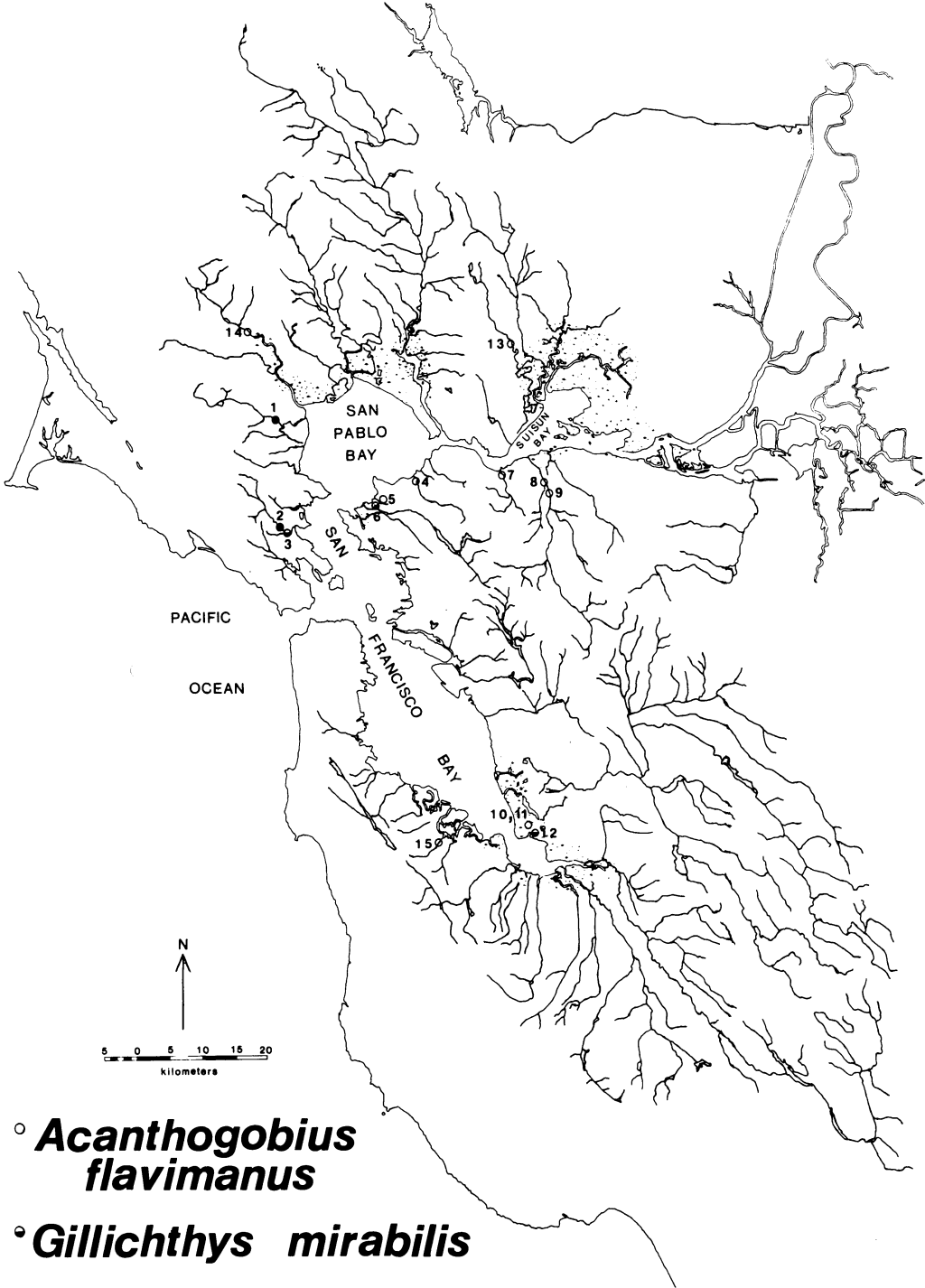


Fig. 36



APPENDIX

Lampetra tridentata

Distributional Records. ALAMEDA COUNTY: Alameda Creek, WPRR bridge below Niles, 14/Oct/55, W.I. Follett and G.M. Peckham (CAS 26155: 1, transforming)⁹; Alameda Creek, ca. 100 yds below SPRR bridge, Niles, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS, Acc. 1955-X: 31, 5 ammocoetes, TL 99-126 mm)¹⁰; Alameda Creek, ca. 200 yds below SPRR bridge at Niles, 11/May/56, G.M. Peckham (CAS, Acc. 1956-V: 24, 1, TL 449 mm)¹¹; Alameda Creek, opposite Calif. Nursery Co., Niles, 25/Mar/57, W.I. Follett and G.M. Peckham (CAS 26255: 1, TL 135 mm)¹²; Alameda Creek (37° 34' lat., 121° 59' long.), 20,21/Jun/73 (Aceituno et al., 1976: 199), 1, FL 605 mm¹⁴. CONTRA COSTA COUNTY: San Pablo Bay, as Entosphenus tridentatus (Evermann, 1910: 132). NAPA COUNTY: Napa River, Calistoga (Snyder, 1908: 158)¹⁵; Chiles Creek, 9/Aug/45, Brian Curtis (CAS 20939: 40 ammocoetes)¹⁸; Conn Creek, pool one mile above junction with Sage Creek near old ranch house, 10/Aug/45, Brian Curtis (CAS 20949: 9)¹⁷; Napa River, Deer Park Road to 1/3 mile below Pope Street bridge, 16,17/Oct/79, CDFG, 35 (fish kill)¹⁶. SANTA CLARA COUNTY: Coyote Creek, as Entosphenus tridentatus (Snyder, 1905: 331); Coyote Creek, San Jose, 1/Oct/22, C.L. Hubbs (UMMZ 61002: 91, 21-50 mm, 141 mm)²; Coyote Creek, San Jose, 23/May/23 (Hubbs, 1924: 592, 158, 9-21 mm)³; Coyote Creek, bridge opposite Milpitas, 16/Oct/32, W.I. Follett and party (CAS, 1)⁶; Coyote Creek, below highway bridge opposite Milpitas, 31/Oct/41, W.I. Follett (CAS, 1)⁷; Coyote Creek, Highway 237 (Scoppettone and Smith, 1978: 63)⁸; Coyote Creek, Trimble Road, 1978 (J. Smith, SJSU, personal communication)⁵; Coyote Creek, mouth of Penitencia Creek, 1978 (J. Smith, SJSU, personal communication)⁴. SAN FRANCISCO COUNTY: San Francisco, San Francisco Co. (Ayres, 1854-1862, as Petromyzon ciliatus).

Lampetra ayresii

Distributional Records. ALAMEDA COUNTY: Alameda Creek, near Niles, 22/Feb/66 (Hopkirk, 1973: 20)¹³. SAN FRANCISCO COUNTY: San Francisco northward, "doubtless ascends most of the coast streams in the spring," as Ammocoetes plumbeus (Jordan, 1881: 30).

Lampetra pacifica

Distributional Records. SANTA CLARA COUNTY: Coyote Creek, San Jose, 23/May/23 (Hubbs, 1924: 592)¹.

Acipenser medirostris

Distributional Records. SAN FRANCISCO COUNTY: San Francisco, as Acipenser acutirostris (Girard, 1857: 34); "Abundant in the Bay and rivers and creeks flowing into it, not on the market as fisherman regard it as poisonous," as A. acutirostris (Lockington, 1879: 51); San Francisco markets (Eigenmann, 1890: 55).

Dorosoma petenense

Distributional Records. SONOMA COUNTY: Petaluma River, Lakeville Hwy. bridge, 19/Aug/1980, CDFG, 2, (fish kill)¹.

Alosa sapidissima

Distributional Records. NAPA COUNTY: Napa River, Mud Slough and Coon Island, 20/May/76, CDFG: 4, FL 150-160 mm². SOLANO COUNTY: Mare Island (introduced) (Evermann, 1910: 134).

Oncorhynchus kisutch

Distributional Records. ALAMEDA COUNTY: Alameda Creek, 1938 or 1939, by L. Shapovalov (J.D. Hopkirk, personal communication). CONTRA COSTA COUNTY: San Pablo Creek, letter to P.R. Needham dated Feb. 21, 1957 (W. Evans, personal communication); Walnut Creek drainage, 1950's to mid-1960's (Leidy, 1983). MARIN COUNTY: Mouth of San Rafael Creek, 18/Mar/26, E.C. Snyder (SU 59662: 10); San Anselmo Creek (Fry 1936: 68); Corte Madera Creek and Arroyo Corte Madera del Presidio [= Mill Valley] Creek; Corte Madera Creek, at Lagunitas Road crossing, 18/Sept/81, L&F, 2: FL 64 mm²; Old Mill [= Mill Valley] Creek, downstream from Locust Road, Mill Valley, 18/Sept/81, L&F, 2: FL 176-197 mm¹. SAN FRANCISCO COUNTY: San Francisco, northward to Kamchatka and Japan (Jordan and Evermann, 1896: 480).

Oncorhynchus keta

Distributional Records. SAN FRANCISCO COUNTY: San Francisco (Jordan and Jouy, 1881: 14); "All streams from San Francisco to Bering Straits" (Jordan and Gilbert, 1881: 40); "San Francisco (to Kamchatka)" (Jordan and Evermann, 1896: 478).

Oncorhynchus tshawytscha

Distributional Records. SOLANO COUNTY: "Sacramento River. Young taken at Mare Island," (Eigenmann, 1890: 60).

Salmo trutta

Distributional Records. NAPA COUNTY: Ritchie Creek, at Hwy. 29 (128) bridge, 9/Sept/81, L&F, 1: FL 287 mm³.

Salmo gairdnerii

Distributional Records. ALAMEDA COUNTY: San Leandro Creek, Type Locality (Gibbons, 1855: 35, 3 young); San Leandro Creek, near Alameda (Jordan, 1907: 83); Alameda Creek, immediately below dam in Niles Canyon, 24/Jul/27, W.I. Follett (CAS, Acc. 1927: 1, large young)¹¹²; Alameda Creek, 19/May/38, L. Shapovalov (CAS, Acc. 1952-X: 30,26); San Leandro Creek, 6/Apr/53, P.R. Needham, W.C. Freihofer and Zool. 138 class (CAS, Acc. 1964-XI: 12A, 3); Stoneybrook Canyon, ca. 1.5 miles above junction with Alameda Creek, elev. 600', lat. 37° 36', 56", long. 121° 56', 30", 13/Oct/55, W.I. Follett and G.M. Peckham (CAS, Acc. 1955-X: 31, 20, TL 3-7 in.)¹¹⁵; Stoneybrook, ca. 1.2 miles above junction with Alameda Creek, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS, Acc. 1955-X: 31, 5, TL ca. 2 in.)¹¹⁴; Alameda Creek, opposite Niles nursery (Calif. Nursery Co.), 25/Mar/57, W.I. Follett and G.M. Peckham (CAS, 3 half-grown)¹¹⁷; *Palomares Creek, pools in lower section, 18/Jun/60, CDFG; San Lorenzo, Alameda, Arroyo Mocho, Arroyo las Positas, San Leandro, Arroyo del Valle, Arroyo de la Laguna Creeks (Skinner, 1962: 131); *San Leandro Creek, 1) mouth of stream, foot of Pinehurst trail, 2) culvert across Canyon Road, intersection of Pinehurst and Canyon Roads, 3) culvert across Canyon Road, ¼ mile below Canyon School, 28/Apr/73 - 2/Jun/73 (Arnold, unpublished manuscript); *Redwood Creek, 1) mouth of stream (Tanner Trail), 2) culvert at intersection of Pinhurst and Redwood Road, 3) below ranger station on Redwood Road, 21/Apr/73 - 2/Jun/73 (Arnold, unpublished manuscript); *Crow Canyon Creek, east of 4821 Crow Canyon Road, Hayward, 8/Jul/75, CDFG (fish kill); *Crow Creek, upstream from Bolinas Creek, 5,6/Aug/75, CDFG, 6; *San Leandro Creek, Lake Chabot to approximately 100 yds downstream from Interstate 580, 12/Aug/75, CDFG, numerous: 2-3 in.; Alameda Creek (T4S, R1W, Sec 12), 16/Oct/75, CDFG, 1: 6 in.¹¹³; Arroyo Mocho Creek, Lawrence Laboratory pumping station (NE¼ of Sec 8, T4S, R3E), 3/Feb/76, CDFG, 12: FL 68-172 mm¹⁰⁵; Arroyo Mocho Creek, Cedar Brook Ranch (SW¼ of Sec 14, T4S, R3E), 3/Feb/76, CDFG, 27: FL 67-318 mm¹⁰⁷; Arroyo Mocho Creek, on Mines Road approx. 0.5 miles above intersection with Del Valle Road (NW¼ of Sec 6, T4S, R3E), 3/Feb/76,

CDFG, 5: FL 165-233 mm¹⁰⁸; Stoneybrook Canyon Creek, 100 yds upstream from confluence with Alameda Creek, 8/Apr/76, CDFG, 1: FL 10 in.¹¹⁶; Redwood Creek, masonry bridge, Redwood Regional Park, 28/Mar/78, CDFG, 5: FL 13.8-15.7 in.⁹⁰; Redwood Creek, downstream from Redwood Canyon fire station, 6/Jun/78, CDFG, 38: FL 1-2.5 in.⁹⁸; Redwood Creek, opposite Redwood Creek fire station, 6/Jun/78, CDFG, 64: FL 0.9-6.5 in.⁹⁹; Alameda Creek, milepost 5, Ohlone Camp Road (Scoppettone and Smith, 1978: 63)¹¹⁰; Alameda Creek, 0.5 km upstream from junction with Calaveras Creek (Scoppettone and Smith, 1978: 64)¹¹¹; Arroyo Mocho Creek, Lawrence Laboratory pumping station (Scoppettone and Smith, 1978: 64)¹⁰⁶; Arroyo Mocho Creek, 1 km above Del Valle Road (Scoppettone and Smith, 1978: 64)¹⁰⁹; Redwood Creek, from Pinehurst Road and Redwood Road culvert downstream approx. 475 yds, 10/Apr/79, CDFG, 71: FL 3-15.9 in.¹⁰⁰; Redwood Creek, pool immediately below masonry road crossing, Redwood Regional Park, 5/Mar/79, CDFG, 3: FL 2.3-15.7 in.⁹¹; Redwood Creek, pool below bridge crossing into Redwood Park, 5/Mar/79, CDFG, 2: FL 3.1-3.2 in.⁹²; Redwood Creek, upstream from bridge crossing into Redwood Park, 5/Mar/79, CDFG, 20: FL 2.8-5.0 in.⁹³; *Redwood Creek, small pool on west fork, approx. 0.5 mile upstream from Piedmont Stables, Redwood Road, 5/Mar/79, CDFG, several: yearling; Redwood Creek, west fork, approx. 0.5 mile downstream from Piedmont Stables, Redwood Road, 5/Mar/79, CDFG, 4: FL 13.6-16.6 in.⁸⁴; Redwood Creek opposite fire station, 5/Mar/79, CDFG, 5: FL 7.9-17.5 in.¹⁰¹; *Redwood Creek, approx. 1.0 mile above masonry road crossing, 5/Mar/79, CDFG, several: yearling; Redwood Creek, upstream from Redwood Park bridge, 21/Mar/80, CDFG, 4: FL 4.1-5.8 in.⁹⁴; Redwood Creek, downstream from masonry bridge crossing in Redwood Park, 21/Mar/80, CDFG, 19: FL 3.0-13.8 in.⁹⁵; Redwood Creek, opposite fire station on Redwood Road, 21/Mar/80, CDFG, 20: FL 3.2-12.7 in.¹⁰²; Redwood Creek, upstream from MacDonald Trail, west branch of Redwood Creek, 3/21/80, CDFG, 12: FL 3.3-9.5 in.⁸⁷; Redwood Creek, pool below culvert crossing immediately upstream of MacDonald Trail, 21/Mar/80, CDFG, 13: FL 4.5-17.2 in.⁸⁶; San Leandro Creek, 30 m downstream from spillway structure below Chabot Dam, 22/Jul/81, L&F, 8: FL 42-311 mm¹⁰⁴; Redwood Creek, 0.6 km downstream from junction of Redwood and Pinehurst Roads (T1S, R3W, Sec 36), 5/Aug/81, L&F,

14: FL 41-127 mm¹⁰³; Redwood Creek, pool below 2nd bridge crossing at main entrance to Redwood Park, 5/Aug/81, L&F, 48: FL 22-146 mm⁹⁶; Redwood Creek, on Redwood Canyon (west) branch of 1st upstream crossing from Redwood Park entrance, 5/Aug/81, L&F, 16: FL 40-130 mm⁹⁷; Redwood Creek, immediately upstream from parking lot at MacDonald Trail branch from parking lot, 5/Aug/81, L&F, 27: FL 35-76 mm⁸⁸; Redwood Creek, 0.25 mile upstream on MacDonald Trail branch from parking lot, 5/Aug/81, L&F, 3: FL 40-56 mm⁸⁹; Redwood Creek, 1.35 km from junction of Skyline and Redwood Roads, 5/Aug/81, L&F, 10: FL 42-80 mm⁸⁵. CONTRA COSTA COUNTY: ". . .

a few miles back of Martinez toward the foot of Monte Diablo", (Ayres, 1855: 43); San Pablo Creek at Orinda, 19/Nov/42, G. Murphy (CAS, Acc. 1964-XI: 13, 1: SL 82.8)⁷⁶; Bear Creek, tributary SE side of San Pablo Reservoir, 4.5 miles from Orinda junction, 1/May/43, G. Murphy (CAS, 4)⁷⁴; San Pablo Creek, upstream from reservoir, 19/Jan/53, W.C. Freihofer (CAS, 4); San Pablo Creek, [West fork], 30/Jan/53 (Needham and Gard, 1959: 38, 30: 96-217 mm)⁷⁸; San Pablo Creek, west branch, Jan/53, P.R. Needham and W.C. Freihofer (CAS, 1)⁷⁷; San Pablo Creek, about 0.25 mile upstream from headwaters of San Pablo Reservoir, 14/Feb/52, P.R. Needham, W.C. Freihofer, and R. Gard (CAS, 8)⁷⁵; San Leandro Creek, [above San Leandro Reservoir], 1953 (Needham and Gard, 1959: 40, 3)⁸³; *Bear Creek, mouth, 5 miles upstream from San Pablo Reservoir, 13/Sept/60, CDFG, a few; Pinole Creek, from tidal zone upstream 1.3 miles, 23/Apr/75, CDFG (fish kill), 101: FL 1.5-12.0 in.⁷¹; Pinole Creek, downstream from natural falls below junction of Hampton and Pinole Valley Road, 5,6/May/76, CDFG, several: juveniles⁷²; Pinole Creek, 200 yd reach downstream from natural falls below junction of Hampton and Pinole Valley Roads, 4/Jun/76, CDFG, 14: FL 4.6-8.4 in.⁷³; San Leandro Creek, 0.5 mile upstream from Upper San Leandro Reservoir (T1S, R3W, Sec 25), 4/Aug/81, L&F, 13: FL 33-212 mm⁸²; San Leandro Creek, 0.45 mile upstream from Canyon Post Office, 4/Aug/81, L&F, 27: FL 40-68 mm⁸⁰; Indian Creek, 20 m upstream from junction with San Leandro Creek, 4/Aug/81, L&F, 2: FL 140-172 mm⁸¹. MARIN COUNTY: San Anselmo Creek (Fry, 1936: 68); *Arroyo Corte Madera del Presidio Creek, 29/Jan/46, CDFG; *San Antonio Creek (Skinner, 1962: 132); *Arroyo Corte Madera del Presidio Creek,

16/Jul/63, CDFG, fingerlings and yearlings: 2-6 in.; Corte Madera Creek, at Lagunitas Road bridge, just west of Ross City Hall, 1/Nov/63. SFSU, 29: fry¹; Corte Madera Creek, between Ross and San Anselmo, 15/May/65, SFSU, 36²; *Arroyo Corte Madera del Presidio Creek, mouth to headwaters, 3.27 miles, 25/Aug/65, CDFG, 10: 1.8-2.8 in.; Corte Madera Creek, bridge at Ross, 9/Oct/67, SFSU, 3: 81-98 mm³; Corte Madera Creek, at Ross, 7/Oct/68, SFSU, 35: 44-133 mm⁴; Corte Madera Creek, bridge at Ross fire station, Ross, 10/Sept/69, SFSU, 3: SL 64-81 mm⁵; Corte Madera Creek, Lagunitas Road bridge in Ross, 27/Sept/71, SFSU, 72: 38-83 mm⁶; Corte Madera Creek at bridge near fire station, Ross, 20/Sept/72, SFSU, 19: SL 50-85 mm⁷; Corte Madera Creek, bridge near Ross fire house off Sir Francis Drake Blvd., 24/Sept/73, SFSU, 10⁸; Corte Madera Creek, vicinity of bridge over creek adjacent to Ross fire station, 16/Oct/74, SFSU, 5: 64-95 mm⁹; *Stemple Creek, mouth to headwaters 15.5 miles, 14/Jul/76, CDFG; Bowman Canyon Creek at Hicks Valley Road crossing (Novato Blvd.), 16/Sept/81, L&F, 3: FL 61-86 mm¹⁸; Miller Creek, 50 m upstream on Lucas Valley Road from junction with Sequeira Road, 17/Sept/81, L&F, 50: FL 38-86 mm¹⁷; Miller Creek at Gallinas Road crossing, 17/Sept/81, L&F, 7: FL 48-162 mm¹⁶; Arroyo de San Jose Creek, at junction with Enfrente Blvd., 17/Sept/81, L&F, 3: FL 61-161 mm¹⁹⁷; Sleepy Hollow Creek, upstream from Butterfield Drive bridge, 18/Sept/81, L&F, 7: FL 58-97 mm¹⁵; Corte Madera Creek, downstream from junction with Madrone Drive, 18/Sept/81, L&F, 2: FL 58-72 mm¹⁴; Unnamed creek through Larkspur at end of Water Way off Madrone Avenue, 18/Sept/81, L&F, 2: FL 51-121 mm¹³; Old Mill Creek, along Cascade Drive, 0.5 mile S from junction with Lovell Avenue, 18/Sept/81, L&F, 16: FL 62-174 mm¹²; Old Mill Creek, at junction with Josephine Street, 18/Sept/81, L&F, 7: FL 50-71 mm¹¹; Widow Reed Creek, downstream from Locust Road, Mill Valley, 18/Sept/81, L&F, 11: FL 52-109 mm¹⁰. NAPA COUNTY: Napa Creek, 31/May/97, C.H. Gilbert (SU 54910, 26); Conn Creek, 26/Jun/97, C.H. Gilbert (SU 60339, 42); *Camp Creek, tributary to Milliken Lake, 24/Jun/40, L. Shapovalov, CDFG; *Sage Creek, 25/Jun/40, CDFG; *Soda Creek, upper Monticello Road-Rutherford Road crossing, 25/Jun/40, CDFG, a few: 3-4 in.; *Camp Creek, tributary to Milliken Lake, 6/Feb/41, CDFG; Moore Creek, 10/Aug/45, B. Curtis, (CAS 20941, 6: SL 52-143 mm)⁵⁷; Chiles Creek, in canyon above the mouth of

Moore Creek, 27/Aug/45, B. Curtis (CAS 20936, 4)⁵⁶; Conn Creek, 10/Oct/45, B. Curtis (CAS, Acc. 1952-X: 30, 2: SL 79-173 mm); Sulphur Springs Creek, 30/Jul/45, CDFG, 700: FL 2-3 in.; Chiles Creek, 15/Jul/50, H.E. Pintler (CAS, Acc. 1953-XI: 23, 1: SL 101 mm); Chiles Creek, about $\frac{1}{2}$ mile above Conn Reservoir, 14/Mar/51, P.R. Needham and class (CAS, Acc. 1964-XI: 13, 4: SL 37-4 mm)⁵⁴; *Suscol Creek, 28/Jan/55, CDFG; *Sage Creek, middle section, 7/Aug/56, CDFG, common: 5-10 in.; *Dry Creek, mouth to headwaters, 22/Oct/56, CDFG; *Kimball Creek, Calistoga Municiple Reservoir downstream to Tubbs Lane, 16/May/57, CDFG, a few: 1-1.5 in.; Redwood Creek, outfall from storm drain 100 yds E of Hwy 29 bridge to confluence with Napa River, 15/Jun/57, CDFG (fish kill), 2500: 1.7-6.8 in.⁵¹; *Howell Creek, below lowermost falls between Derbfus Ranch and 3 miles upstream, 14/May/58, CDFG, common: 1.5-2.0 in.; *Howell Creek, between lower and upper falls, between Derbfus Ranch and 3 miles upstream, 14/May/58, CDFG; *Redwood Creek, below Hwy 29 bridge (21-56), 4/Jun/58, CDFG, common: 1-2 in.; *Ritchie Creek, Hwy 29 bridge, 4/Jun/58, common: 1.5-2.0 in.; *Bear Creek, Ingelnook Dam upstream approximately 3 miles, 19/Oct/58, CDFG, fairly common: 5-6 in.; Bear Canyon Creek, $\frac{1}{2}$ mile section below Ingelnook Dam, 19/Oct/58, CDFG, fairly common; *Sulphur Creek, mouth to headwaters, 28/Oct/58, CDFG; *Tulacay Creek, mouth to headwaters, 13/Nov/58, CDFG, scarce: 3-4 in.; *Napa Creek, midsection, 14/Nov/58, CDFG; *Redwood Creek, mouth to 3.5 miles upstream, 14/Nov/58, CDFG, *Dutch Henry Creek (T8N, R6W, Sec 10), 16/Nov/58, CDFG, scarce: 3-5 in.; *Soda Creek, mouth to headwaters, 16/Nov/58, CDFG; *Huichica Creek, headwater tributary between Loyal and Carneros Valleys to approximately 2.7 miles downstream, 8/Jul/60, CDFG, scarce: 3-4 in.; *Huichica Creek, downstream from concrete barrier on Hwy 12, Feb/62, CDFG, 2: 13 in.; *Dry, Redwood [Napa], Conn, Calabazas, Carriger, and Adobe Creeks (Skinner, 1962: 133, 137); *Sulphur Creek, Sulphur Canyon Road (NW $\frac{1}{4}$ of Sec 3, T7N, R6W, Jan/64, CDFG, 36: 1.3-5.3 in.; Soda Creek, two miles above junction with Napa River, 24/Feb/64, CDFG, 14⁵⁸; *York Creek (T8N, R6W, Sec 25), 19/May/66, CDFG; *Bear Canyon Creek, $\frac{1}{2}$ mile section below Ingelnook Dam (T7N, R5W, Sec 17), 24/May/66, CDFG; *Redwood Creek, north branch, from mouth 2 miles upstream, 7/Jun/66, CDFG; *Redwood Creek, section above junction of Redwood and Dry Creek Roads, 8,9,10/Jun/66,

CDFG; *Redwood Creek, junction with Mt. Veder Road to approximately 1 mile below Coker Tree Farm 8,9,10/Jun/66, CDFG; *Millicen Creek, immediately below Silverado Country Club Drive, 7/Mar/67, CDFG, 1: 20 in.; *Redwood Creek, upper drainage, 10/Mar/67, CDFG, 50: 1-3 in.; *Upper Redwood Creek, immediately above county road, downstream to Pickle Canyon, 20/Jun/67, CDFG, 50: 1-5 in.; Pickle Canyon Creek, 1 mile above confluence with Redwood Creek, 26/Jun/67, CDFG, 22⁴⁹; *Ritchie Creek, above 8' high diversion dam, 13/Jun/67, CDFG; *Ritchie Creek, downstream from diversion dam to Hwy 29 bridge, 13/Jul/67, CDFG; *Ritchie Creek, pools near mouth, 13/Jul/67, CDFG; *Bell Canyon Creek, Bell Canyon Dam to mouth, 20/Jun/69, CDFG; Bell Canyon Creek, approximately 1 mile downstream from Bell Canyon Dam (NE $\frac{1}{4}$ of SW $\frac{1}{4}$ of Sec 13, T8N, R6W), 18/Jul/69, CDFG, 80: FL 2-3.5 in.²⁷; Bell Canyon Creek, 100 ft upstream from confluence with south fork of Bell Canyon Creek, 18/Jul/69, CDFG, 33: FL 1.5-6.0 in.²⁸; Napa River, Zinfandel Lane bridge, 29/Jul/69, CDFG⁴²; Napa River, Pope Street bridge, 31/Jul/69, CDFG⁴¹; Napa River, Pratt Ave bridge, 4/Aug/69, CDFG³³; Dry Creek, vicinity of Dry Creek Road bridge (SE $\frac{1}{4}$ of Sec 10, T6N, R5W), 1/Oct/69, CDFG, 75: FL 1.5-6.7 in.⁴⁴; Ritchie Creek, State Hwy 29 bridge, 7/Aug/69, CDFG, 40: 1.7-6.0 in.²⁹; Ritchie Creek, 500 ft upstream from concrete diversion dam, 7/Aug/69, CDFG, 55: FL 1.8-4.8 in.³⁰;

*Napa River, downstream from Kimball Dam, 8/Aug/69, CDFG, 22: FL 2.7-4.1 in.; Redwood Creek, one mile northwest of Mont La Salle School in (SE $\frac{1}{4}$ of Sec 22, T6N, R5W), 1/Oct/69, CDFG, 70: FL 1.5-5.2 in.⁴⁷; *Garnett Creek, 1/Jul/70, CDFG; *Garnett Creek, 1.5 miles upstream from Hwy 29 bridge to mouth, 16/Jun/70, CDFG; Wooden Valley Creek at Wooden Valley Road bridge (T6N, R3W, Sec 23), 10/Aug/72, P.B. Moyle (UCDPM 72-11, 1)⁷⁰; *Suscol Creek, Napa River to headwaters, 8,9/May/73, CDFG; *Dry Creek (T5N, R4W, Sec 25) to a point 8 miles downstream, 3,7,8/Aug/73, CDFG; *Ritchie Creek, mouth to headwaters, 5/Oct/73, CDFG; *York Creek, between Spring Mountain Road bridge in St. Helena and the upper reservoir, 13/Jun/74, CDFG; *Millicen Creek, 15/Jul/75, CDFG; *Bell Canyon Creek, Bell Canyon Dam to mouth, 17/Jul/75, CDFG; *York Creek, city of St. Helena, upper water supply reservoir to headwaters, 5/Aug/75, CDFG; *Bear Canyon Creek, mouth to 3.3 miles upstream

12/Sept/75, CDFG; *Milliken Creek, below 3rd barrier between Silverado Country Drive and Milliken Reservoir, 3/Nov/75, CDFG; *Milliken Creek, lower section below canyon, 5/Dec/75, CDFG; *Redwood Creek, 5 miles above mouth, 13,14/Apr/77, CDFG; *Dry Creek, Hwy 29 to headwaters, 12.2 miles, 13,14/Jun/77, CDFG; Bell Canyon Creek, at Crystal Springs Road, 24/Apr/78, CDFG (fish kill), 106: young of the year²⁶; Pickle Creek, 10,11/May/78, CDFG, 30: FL 2.5-3.1 in.; *Ritchie Creek, upper portions, 6/Jul/78, CDFG; *Mill Creek, mouth to headwaters, 3.2 miles, 3,7/Aug/78, CDFG; Milliken Creek above city of Napa diversion dam, CDFG, 5: FL 115-199 mm; Milliken Creek, mouth of Milliken Canyon, CDFG, 13: FL 117-187 mm⁶⁶; Soda Creek, 0.7 mile upstream from junction with Silverado Trail, 21/May/80, CDFG, 7: FL 52-67 mm⁵⁹; Soda Creek, junction of Loma Vista Drive and Soda Canyon Road, 21/May/80, CDFG, 6: FL 57-69 mm⁶⁰; Soda Creek, below 15' falls on Soda Canyon Road, 21/May/80, CDFG, 37: FL 60-279 mm⁶¹; Sulphur Creek, 1st Pope Street crossing above Silverado Trail, 23/May/80, CDFG, 5: FL 42-63 mm³⁷; Sulphur Creek, above junction with Pope Street, 23/May/80, CDFG, 1: FL 39 mm³⁸; Sulphur Creek, below Sulphur Springs Avenue (near BM 309), 23/May/80, CDFG, 2: FL 57-245 mm³⁹; Sulphur Creek, last upstream crossing of Sulphur Canyon Road, 23/May/80, CDFG, 17: FL 33-270 mm³⁶; *Huichica Creek, 0.9 mile downstream from concrete dam, 8/Jul/80, CDFG; Garnett Creek, (T9N, R7W, Sec 24), 21/May/81, CDFG (Fish rescue), 1297: young of the year²⁵; Sulphur Creek (T7N, R6W, Sec 1), 4/Jun/81, CDFG (fish rescue), 690⁴⁰; Dry Creek between Dry Creek Road and Hwy 29, 17/Jun/81, CDFG (fish rescue), 1183: young of the year⁴⁵; Conn Creek, 50 m upstream from junction with Howell Mountain Road, 9/Sept/81, L&F, 2: FL 43-58 mm⁵²; Ritchie Creek at junction with Hwy 29, 9/Sept/81, L&F, 16: FL 37-387³¹; Mill Creek at Hwy 128, 9/Sept/81, L&F, 5: FL 42-66 mm³²; York Creek, above dam ½ mile on Spring Mountain Road, 9/Sept/81, L&F, 7: FL 56-208 mm³⁴; Sulphur Canyon Creek, 1.7 miles upstream along White Sulphur Springs Road (Spring Road) from junction with Main Street, St. Helena, 9/Sept/81, L&F, 2: FL 35-47 mm³⁵; Napa River at Yountville Cross Road, 10/Sept/81, L&F, 1: FL 118 mm; Dry Creek, 7.75 miles upstream on Dry Creek Road from junction with Redwood Road, 10/Sept/81, L&F, 2: FL 60-98 mm⁴³; Redwood Creek along Redwood Road, 0.25 mile downstream from

junction with Browns Valley Road, 10/Sept/81, L&F, 2: FL 57-82 mm⁵⁰; Redwood Creek, Pickle Canyon bridge, on Mt. Veder Road, 10/Sept/81, L&F, 6: FL 72-212 mm⁴⁸; Redwood Creek, 6.25 miles upstream on Redwood Road from junction with Hwy 29, 10/Sept/81, L&F, 4: FL 30-72 mm⁴⁶; Conn Creek at milepost 8.07 E on Hwy 128, 10/Sept/81, L&F, 1: FL 73 mm⁵³; Chiles Creek, ¼ mile above junction with Moore Creek, 10/Sept/81, L&F, 2: FL 78-80 mm⁵⁵; Spencer Creek at Wildhorse Valley Road (T5N, R3W, Sec 8), 12/Sept/81, L&F, 7: FL 57-72 mm⁶⁸; Murphy Creek at junction with Shadybrook Lane, 12/Sept/81, L&F, 2: FL 38-52 mm⁶⁷; Milliken Creek at West Trancas crossing, 12/Sept/81, L&F, 2: FL 64-162 mm⁶⁴; Milliken Creek at junction with Westgate Drive immediately before Milliken Drive (T6N, R4W, Sec 24), 12/Sept/81, L&F, 7: FL 61-105 mm⁶⁵; Soda Creek, bridge at milepost 3.15 on Soda Canyon Road, 12/Sept/81, L&F, 11: FL 42-105 mm⁶³; Soda Creek at milepost 2.25 on Soda Canyon Road, 12/Sept/81, L&F, 2: FL 42-57 mm⁶². SAN FRANCISCO COUNTY: Chico Creek, San Francisco, as Salar iridea (Girard, 1857: 83). SAN MATEO COUNTY: San Matteo [Mateo] Creek, 1855, R.D. Cutts (Girard, 1859: 323, 6)¹⁹⁶; San Francisquito Creek (Girard, 1857: 83); San Francisquito Creek, 1896-1898?, E.Z. Hughs (SU 4729, 2); San Francisquito Creek, El Camino Real and SPRR bridge, Palo Alto, 13/Apr/38, L. Shapovalov (SU 19203, 27)¹⁹¹; *Mills Creek, mouth to 2 miles upstream, 26/Sept/58, CDFG, young; San Francisquito Creek (Skinner, 1962: 135); Bear Creek, Sand Hill Road bridge, 3/Jul/74, CDFG, 48: FL 2-4.2 in.¹⁶⁹; Bear Creek downstream from Fox Hollow Road bridge, 3/Jul/74, CDFG, 13: FL 2.3-3.8; Bear Creek, Mountain Home Road bridge, 3/Jul/74, CDFG, 35: FL 2.8-8.3 in.¹⁷²; West Union Creek, 300 ft downstream from Woodside Road bridge, 3/Jul/74, CDFG, 27: FL 1.9-6.8 in.¹⁸⁰; Bear Creek, downstream from Fox Hollow Road bridge, 15/Jul/74, CDFG, 29: FL 2.4-5.7 in.; West Union and Bear Gulch Creek junction to confluence with San Francisquito Creek, 24/May/76, CDFG, 150; *West Union Creek, 400 yds below confluence of McGarvey Gulch, 29/Jun/76, CDFG, 1: 8 in.; *San Francisquito Creek, from two headwater streams (Corte Madera Creek and Bear Creek) downstream to Stanford golf course, 1,2,5/Jul/76, CDFG, 10: San Francisquito Creek above Junipero Serra Blvd crossing, 13/Jul/76, CDFG, 1: FL 1.9 in.¹⁹⁰; San Francisquito Creek, 75 yds below Junipero Serra Fwy 280,

13/Jul/76, CDFG, 7: FL 1.7-5.8 in.¹⁸⁸; West Union Creek, drying pools near lowermost boundary of Huddart Park, 13/Jul/76, CDFG 1: FL 6 in.¹⁷⁸; West Union Creek, at Twin Falls above Huddart Park, 13/Jul/76, CDFG, 3: FL 6.5-7.9 in.¹⁷⁹; West Union Creek, Kings Mountain Road crossing, 14/Jul/76, CDFG, 28: FL 1.7-8.8 in.¹⁸¹; Los Trancos Creek, upstream from the lowermost Los Trancos Creek Road crossing, 14/Jul/76, CDFG, 26: FL 1.6-8.1 in.¹⁸³; Los Trancos Creek, near Alpine Hills Tennis and Swimming Club, 14/Jul/76, CDFG, 20: FL 1.5-9.3 in.¹⁸⁴; Bear Creek above Sand Hill Road crossing, 15/Jul/76, CDFG, 3: FL 6.8-8.3 in.¹⁷⁰; Bear Creek, above Mountain Home Road bridge, 15/Jul/76, CDFG, 33: FL 1.6-8.3 in.¹⁷³; *Los Trancos Creek, upstream from Felt Lake diversion dam, 7/Aug/76, CDFG, several; Los Trancos Creek, channel under Fwy. 280 bridge, 12,13/Jun/78, CDFG, 60 of 412: FL 2.0-4.2 in.¹⁸⁷; Los Trancos Creek, private bridge crossing 0.1 mile from Alpine Road and Los Trancos Road intersection, 12,13/Jun/78, CDFG, 2: FL 3.4-3.9 in.¹⁸⁵; Bear Creek, upstream from Sand Hill Road bridge, 29/Jun/78, CDFG, 3: FL 5 in.¹⁷¹; Bear Creek, upstream from Mountain Home Road bridge, Woodside, 9/Aug/79, CDFG, 85: FL 2.0-8.5 in.¹⁷⁵; San Francisquito Creek, private bridge off Alpine Road near Hwy 280, 16/Aug/81, L&F, 2: FL 51-73 mm¹⁸⁹; Los Trancos Creek, at Felt Lake diversion below Arastradero Road, 16/Aug/81, L&F, 7: FL 48-335 mm¹⁸⁶; San Mateo Creek at junction of Sierra Drive, 17/Aug/81, L&F, 7: FL 50-131 mm¹⁹²; San Mateo Creek, 1 km downstream from junction of Crystal Springs Road and Polhemus Road, 17/Aug/81, L&F, 1, FL: 108 mm¹⁹³; San Mateo Creek at junction with Crystal Springs and Polhemus Roads, 17/Aug/81, L&F, 2: FL 91-106 mm¹⁹⁴; Polhemus Creek, large pool 0.5 km upstream from junction of Crystal Springs Road and Polhemus Road, 17/Aug/81, L&F, 7: FL 196-322 mm¹⁹⁵; Bear Creek, 0.3 km downstream from Adobe Corner, Woodside, 22/Aug/81, L&F, 5: FL 82-111 mm¹⁷⁶; Bear Gulch Creek at La Honda Road, 22/Aug/81, CDFG, 3: FL 140-245 mm¹⁷⁷; West Union Creek at junction with Kings Mountain Road, 22/Aug/81, L&F, 16: FL 51-162 mm¹⁸²; Alambique Creek at La Honda Road crossing, 22/Aug/81, L&F, 2: FL 45-52 mm¹⁶⁸; Corte Madera Creek at junction with Willowbrook Road, 7/Sept/81, 7/Sept/81, L&F, 52: FL 35-86 mm¹⁶⁷; Corte Madera Creek at junction of Alpine Road and lower Coal Creek, 7/Sept/81, L&F, 28: FL 32-137 mm¹⁶⁶. SANTA CLARA COUNTY: *Coyote Creek, 1898?, J.O.

Snyder (SU 23657, 43); Stevens Creek, 1896-1898?, W.W. Thoburn (SU 4758, 6); Saratoga Creek 1896-1898?, E.Z. Hughs? (SU 4726, 6); Ysabel [Santa Isabel] Creek, 20/Jul/98, J.O. Snyder (SU 16872, 31); San Antonio, Stevens, Campbell, Guadalupe, Coyote, Arroyo Honda, Smith, Isabel Creeks (Snyder, 1905: 337); Coyote Creek (Fry, 1936: 67); Stevens Creek, above and below Stevens Creek Reservoir (Dill, 1938: 6); *Stevens Creek at junction of Stevens Creek Reservoir spillway, 16/May/41, L. Shapovalov, CDFG, 1: 1.25 in.; Stevens Creek above and below Stevens Creek Reservoir (Shapovalov, 1942); Deer Creek (T6S, R4W, Sec 17, elev. 1500 ft), 26/Jul/42, L. Shapovalov (CAS, Acc. 1952-X: 30, 1); Stevens Creek (Shapovalov, 1943); Stevens Creek, above and below Stevens Creek Reservoir (Shapovalov, 1944); Stevens Creek, 2/Oct/44, CDFG (CAS, Acc. 1952-X: 30, 7: SL 69-106 mm); Stevens Creek, 2/Oct/44, CDFG (CAS, Acc. 1952-X: 30: 45: SL 56-126 mm); *Stevens Creek, 2/Oct/44, CDFG (CAS, Acc. 1952-X: 30, 22: SL 63-124 mm); Stevens Creek (Shapovalov, 1945); Coyote River at junction of Cochran and Malaguira Roads, between Madrone and Morgan Hill, 24/Aug/45, D.A. and H. Simpson (CAS 13269, 1: half-grown)¹³⁴; Coyote River on Hwy 101, 1.5 miles N of Coyote at concrete dam, 24/Aug/45, D.A. and H. Simpson (CAS 13277, 1: SL 92 mm)¹³⁶; *Stevens Creek (Shapovalov, 1946); Coyote Creek, 0.4 mile by road downstream from Gilroy Hot Springs Road and Canada Road (T10S, R4E, Sec 12), 23/Jul/53, T.J. Merkel, CDFG, 1: fingerling¹³³; Guadalupe Creek, from 0.2 to 0.5 mile by road downstream from Hicks and Shannon Roads junction (T8S, R1E, Sec 19), 24/Jul/53, T.J. Merkel, CDFG¹⁴³; Guadalupe Creek, 1.4-1.5 miles by road upstream from junction of Hicks and Shannon Roads (T8S, R1E, Sec 30), 24/Jul/53, T.J. Merkel, CDFG¹⁴⁶; Guadalupe Creek, 0.3 mile by road upstream from junction of Hicks Road and Shannon Road (T8S, R1E, Sec 30), 24/Jul/53, T.J. Merkel, CDFG¹⁴⁷; Guadalupe Creek, from bridge crossing at Hicks Road and Coleman Avenue upstream to dam, 18/Jul/56, CDFG¹⁴⁸; Hicks Creek, 18/Jul/56, CDFG¹⁴⁹; Pheasant Creek, 18/Jul/56, CDFG¹⁵⁰; Guadalupe Creek, Hicks Road, 29/Oct/57 (SJSU, GD-8); *Arroyo Hondo Creek (Skinner, 1962: 135); *Coyote Creek, confluence with Coyote Reservoir upstream 8.2 miles to center of Sec 24 of T9S, R4E, 18/Mar/65, CDFG, 2: 5-6 in.; Coyote Creek (lat. 37°, 10', long. 121°, 38'),

21/Jun/73 (Aceituno, et al., 1976: 203: 1: FL 201 mm)¹³⁵; Isabel Creek, Kincaid Road bridge, 2/Jun/75, CDFG, 5: FL 6-8.5 in.¹²³; *Upper Penitencia Creek at junction with Arroyo Aguague Creek, 3/Jul/75, CDFG, 50+; Upper Penitencia Creek, downstream from Cherry Flat Reservoir spillway, 3/Jul/75, CDFG, 1: 7 in.¹³⁷; Arroyo Aguague Creek, near mouth, 12/Sept/75, CDFG, 63: FL 1.5-7 in.¹³⁹; Guadalupe Creek, 2 to 3 miles downstream from Guadalupe Dam along Hicks Road (T8S, R1E, Secs 19 and 30), 14/Nov/75, CDFG, numerous: 2-13 in.¹⁴⁴; Stevens Creek, Stevens Creek Road bridge nearest Stevens Canyon Road, 8/May/85, CDFG, 6: FL 3.5-5 in.¹⁶³; Isabel Creek, Kincaid Road (Scoppettone and Smith, 1978: 63)¹²⁴; Smith Creek, Mt. Hamilton Road (Scoppettone and Smith, 1978: 63)¹²⁰; Arroyo Hondo Creek, Arroyo Hondo Road (Scoppettone and Smith, 1978: 63)¹²⁶; Coyote Creek, middle fork, Coe State Park (Scoppettone and Smith, 1978: 63)¹²⁹; Arroyo Aguague Creek, 1 km upstream from mouth (Scoppettone and Smith, 1978: 63)¹³⁸; Penitencia Creek, Alum Rock Park (Scoppettone and Smith, 1978: 63)¹⁴⁰; Upper Penitencia Creek at water treatment outfall opposite Linda Vista Road, 11/Aug/81, L&F, 1: FL 147 mm¹⁴²; Smith Creek at Mt. Hamilton Road crossing, 13/Aug/81, L&F, 9: FL 40-210 mm¹²¹; Isabel Creek at junction with Kincaid Road (T6S, R3E, Sec 32), 13/Aug/81, L&F, 10: FL 99-397 mm¹²⁵; Colorado Creek, 0.5 mile upstream from junction with Mines Road (T6S, R4E, Sec 11), 13/Aug/81, L&F, 49: FL 48-282 mm¹¹⁹; Stevens Creek, downstream from Stevens Creek bridge (T7S, R2W, Sec 15), 19/Aug/81, L&F, 4: FL 65-110 mm¹⁶⁴; Stevens Creek, 100 m upstream from USGS gaging station at Stevens Creek County Park (T7S, R2W, Sec 22), 19/Aug/81, L&F, 2: FL 60-192 mm¹⁶⁵; Stevens Creek, 20 m downstream from 1st bridge above Eden Road (T7S, R2W, Sec 34), 20/Aug/81, L&F, 2: FL 48-58 mm¹⁶¹; Stevens Creek, bridge at milepost 5.90, upstream from Stevens Creek Reservoir, 20/Aug/81, L&F, 15: FL 58-72 mm¹⁶²; Bonjetti Creek, 0.3 km upstream from junction with Saratoga Creek, 21/Aug/81, L&F, 3: FL 32-59 mm¹⁵⁷; McElroy Creek, south branch, 0.3 km upstream from Saratoga Creek (T8S, R2W, Sec 10), 12/Aug/81, L&F, 4: FL 37-56 mm¹⁵⁸; Saratoga Creek, 0.4 km upstream from confluence with Booker Creek, 21/Aug/81, L&F, 6: FL 46-62 mm¹⁵⁹; Saratoga Creek at 4th Street bridge, Saratoga, 21/Aug/81, L&F, 15: FL 61-170 mm¹⁶⁰; Saratoga Creek at Crestbrook

Drive bridge, 21/Aug/81, L&F, 4: FL 56-226 mm; Guadalupe River at USGS gaging station on Hicks Road (T8S, R1E, Sec 19), 26/Aug/81, L&F, 4: FL 96-167 mm¹⁴⁵; Rincon Creek, 50 m upstream from confluence with Guadalupe River, 26/Aug/81, L&F, 6: FL 60-72 mm¹⁵¹; San Felipe Creek at San Felipe Valley Road bridge, 5/Sept/81, L&F, 23: FL 30-80 mm¹²²; Los Gatos Creek, small NE- to SW-running tributary, 0.15 mile upstream from Wrights Station Road crossing (T9S, R1W, Sec 23), L&F, 2: FL 56-58 mm¹⁵³; Austrian Gulch Creek, 0.25 mile upstream from road crossing above NE arm of Lake Elsmar (T9S, R1E, Sec 24), 6/Sept/81, L&F, 275: FL 32-60 mm¹⁵²; Saratoga Creek, unnamed branch along Sanborn Road, under bridge 2.7 km upstream from Hwy 9, 7/Sept/81, L&F, 1: FL 178 mm¹⁵⁶; Penitencia Creek, lower boundary of Alum Rock Park, 1982 (J. Smith, personal communication), SJSU, approximately 200 young¹⁴¹. SOLANO COUNTY: *Suisun Creek (Skinner, 1962: 136). SONOMA COUNTY: Petaluma (Girard, 1857: 541)¹⁹; Petaluma Creek (Girard, 1859: 323, 2); *Sonoma Creek, 4/Feb/57, CDFG; *Graham Creek, mouth to headwaters, 2 miles, 4/Dec/59, CDFG; *Graham Creek, 100 yds below company dam, 9/Feb/60, CDFG; *Graham Creek, Warm Springs Creek Road upstream to water company dam, 26/Apr/60, CDFG; *Calabazas Creek, mouth to headwaters, 3 miles, 16,18/Jan/61, CDFG, 9; *Adobe Creek, headwaters to mouth, 7 miles, 11/Jul/68, CDFG; *Lichau Creek, 2 small pools in headwater area, 17,18/Jul/68, CDFG, approximately 10: 2-7 in.; *Yulupa Creek, pools below flashboard dam, CDFG; *Agua Caliente Creek, headwaters to mouth, 7.2 miles, CDFG; *Nathanson Creek, tributary to Schell Creek, pool below 60 ft falls, 12/Sept/74, CDFG, 20: 2-7 in.; *Rodgers Creek, 1/8 mile from mouth to 2¼ miles downstream from headwaters, 29/Jul/75, CDFG; *Calabazas Creek, middle and headwater reaches, 12/Sept/75, CDFG; *Stemple Creek, 17/Oct/75, CDFG; *Carriger Creek, headwaters to mouth, 8 miles, 25/Mar/76, CDFG; *Arroyo Seco Creek, 1.5 miles upstream from mouth, 15/Jun/76, CDFG, 1; *Bear Creek, pools up to 0.2 mile above mouth, 15/Jul/76, CDFG; *Graham Creek, mouth upstream to bedrock falls, 13/Aug/76, CDFG; Sonoma Creek, on Adobe Canyon Road 0.25 mile downstream from entrance to Sugarloaf Ridge State Park (T6N, R6W, Sec 21), 14/Sept/81, L&F, 5: FL 44-75 mm²⁰; Yulupa Creek, 0.25 m upstream on Bennett Valley Road from junction with

Warm Springs Road (T6N, R6W, Secs 7 and 8), 14/Sept/81, L&F, 3: FL 72-173 mm²²; Sonoma Creek, 0.5 mile on Warm Springs Road from junction with Hwy 12 (Kenwood), 14/Sept/81, L&F, 17: FL 71-143 mm²¹; Graham Creek, 0.5 mile upstream on Sonoma Mountain Road from junction with Warm Springs Road, 14/Sept/81, L&F, 5: FL 59-132 mm²³; Carriger Creek, 0.5 mile S of junction with Canyon Road, 14/Sept/81, L&F, 3: FL 58-149 mm²⁴.

Cyprinus carpio

Distributional Records. ALAMEDA COUNTY: Alameda Creek at WPRR bridge below Niles, 14/Oct/55, W.I. Follett and G.M. Peckham (CAS, Acc. 1955-X: 31, many large young)²⁶; Alameda Creek, 0.2 mile above WPRR bridge below Niles, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS 26164, 82: 29-207 mm)²⁷; Alameda Creek, ca. 100 yds below WPRR bridge, Niles, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS, Acc. 1955-X: 31, several large young)²²; Alameda Creek, Niles opposite California Nursery Company, 25/Mar/57, W.I. Follett and G.M. Peckham (CAS 26257, 2: half-grown to small adult)²³; Alameda Creek, at Niles Sand and Gravel Company, 22/Apr/57, W.I. Follett and G.M. Peckham (CAS 26727, 7: large young to half-grown)²⁴; Alameda Creek, near Niles nursery, 31/Oct/58, W.I. Follett and G.M. Peckham (CAS, many)²⁵; Alameda Creek, at bridge on Hesperian Blvd, N of Alvarado, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 2: SL 74-82 mm)²⁸; Alameda Creek, Niles Canyon Creek, Niles Canyon picnic ground at railroad bridge, 20/Feb/72, W.I. Follett (CAS, 1)²⁰; Alameda Creek, 3.4 miles E of bridge "1948," Niles Canyon, 20/Feb/72, W.I. Follett (CAS, 3)¹⁹; Alameda Creek (lat. 37°, 33', long. 122°, 04'), 20,21/Jun/73 (Aceituno et al., 1976: 199, 24: FL 21-216 mm)²¹; Alameda Creek (lat 37°, 35', long. 122°, 55'), 20,21/Jun/73 (Aceituno et al., 1976: 199, 1: FL 204 mm)¹⁸; *San Leandro Creek, north branch [Moraga Creek], between road crossings adjacent to firehouse on Moraga Way, 14,15/Aug/74, CDFG, 1: 10 in.; Arroyo de la Laguna Creek, first bridge downstream from Castlewood Golf Course, 13/Nov/75, CDFG, 5¹⁵; Arroyo de la Laguna Creek, upstream from

Bernal Road bridge, 4/Feb/76, CDFG, 2: FL 122-141 mm¹⁴; Arroyo de la Laguna Creek, downstream from Castlewood Road bridge, 4/Feb/76, CDFG, 7: FL 136-233 mm¹⁶; Arroyo de la Laguna Creek, 200 yds upstream from Interstate 680 bridge, 9/Apr/76, CDFG, 3: FL 9.25-10 3/8 in.¹³; Arroyo de la Laguna Creek, Castlewood Road (Scoppettone and Smith, 1978: 64)¹⁷; Arroyo Valle Creek, two ponds lying immediately to the south of Shadow Cliffs Reservoir, Jul/78, CDFG¹²; Arroyo Mocho Creek, at junction with Hopyard Road, Pleasanton, 30/Jun/81, L&F, 2: FL 119-162 mm¹¹; South San Ramon Creek, downstream from junction with Alcosta Blvd., 30/Jul/81, L&F, 1: FL 288 mm⁹; South San Ramon Creek, pool upstream from Hwy 580 crossing, 31/Jul/81, L&L, 6: FL 120-281 mm¹⁰. CONTRA COSTA COUNTY: Pinole Creek, upstream from tidal zone 1.3 miles, 21/Apr/75, CDFG, 1: FL 14 in.⁷; *Pine Creek, mouth, [junction with Walnut Creek], 28/Jul/77, CDFG, several, 6-12 in.; Walnut Creek, 50 m upstream from junction with Pine Creek, 5/Oct/80, L&L, 3: TL 150-190 mm⁶; Grayson Creek, 50 m upstream from Hwy 24 crossing, 12/Oct/80, L&L, 1: TL 214 mm⁵; San Pablo Creek, opposite Rancho School, El Sobrante, 13/Jul/81, L&F, 1: FL 205 mm⁸. MARIN COUNTY: *Stemple Creek, 14/Jul/76, CDFG. NAPA COUNTY: Suisun Creek, large pools at the foot of the spillway [Lake Curry], (Shapovalov, 1940: 13)³; *Bell Canyon Creek, Bell Canyon Dam to mouth, 20/Jun/69, CDFG, 6: 4-8 in.; Napa River upstream from Lincoln Avenue bridge, Napa, 1/Nov/73, CDFG, 1: FL 478 mm²; *Napa River, Oak Knoll Road bridge upstream to 1/8 mile above confluence with Dry Creek, 22/Mar/77, CDFG, 4. SANTA CLARA COUNTY: Coyote Creek, at Calif. Hwy 9 (opposite Milpitas), 2/Aug/44, W.I. Follett (CAS 18613, 1: 104 mm)²⁹; *Lower Penitencia Creek, Abel Street, between Junipero Drive and Corning Avenue, Milpitas, 1975, CDFG, 1: 8 in.; Lower Penitencia Creek, at Redwood Avenue footbridge, 1975, CDFG (fish kill), 1000: 2-14 in.; Guadalupe Creek, Montague Expressway N to Lick Mill Road, 23/Aug/76, CDFG (fish kill), 900: 3-8 in.³¹; Stevens Creek, 0.5 to 0.75 mile downstream from Hwy 101 crossing, 8/May/78, CDFG (fish kill), 12: 4-10 in.³⁴; Adobe Creek, at Frontage Road crossing on W side of Hwy 101, 18/Aug/81, L&F, 1: FL 67 mm³⁵; Saratoga Creek, at Mission College Blvd. (T6S, R1W, Sec 21), 21/Aug/81, L&F, 7: FL 83-157 mm³²; Guadalupe River, at West Virginia Avenue crossing, 26/Aug/81,

L&F, 2: FL 50-52 mm³³; Coyote Creek, at Hwy 17 crossing, 31/Aug/81, L&F, 1: FL 182 mm³⁰. SOLANO COUNTY: Green Valley Creek, at SPRR bridge, 2/Oct/81, L&L, 2: FL 72-109 mm⁴. SONOMA COUNTY: Petaluma River, Lakeville Hwy bridge, 19/Aug/80, CDFG, 12¹.

Carassius auratus

Distributional Records. ALAMEDA COUNTY: Alameda Creek, at bridge on Hesperian Blvd. N of Alvarado, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 4: 72-88 mm)²⁰; Alameda Creek (lat. 37°, 34', long. 121°, 59'), 20,21/Jun/73 (Aceituno et al., 1976: 199, 3: FL 142-184 mm)¹⁹; San Leandro [Moraga] Creek, west branch, downstream from 2nd upstream drop structure within Moraga Country Club, 15/Aug/74, CDFG, 1: 6 in.⁶; Arroyo de 101, 1,2,5/Jul/76, CDFG. SANTA CLARA COUNTY: Stevens Creek, pool at foot of spillway [Stevens Creek Reservoir] (Shapovalov, 1942: 6)⁴⁰; Stevens Creek (Shapovalov, 1943: 6)³⁸; Stevens Creek (Shapovalov, 1944)³⁹; Coyote Creek (lat. 37°, 25', long. 121°, 55'), 21/Jun/73 (Aceituno et al., 1976: 203, 12: FL 18-165 mm)²¹; Berryessa Creek, 0.75 mile upstream from mouth, 27/Jun/75, CDFG; Coyote Creek, at Hwy 237 crossing, 23/Sept/75, CDFG, 20: FL 3-6.2 in.²²; Guadalupe River, West Taylor Street bridge, 26/Sept/75, CDFG, 2: FL 1-2 in.³⁰; Guadalupe River, Auzerius Street bridge, 26/Sept/75, CDFG, 5: FL 1.5-2.5 in.³¹; Guadalupe River, Alma Street bridge, 26/Sept/75, CDFG, 20: FL 1-3 in.³³; Guadalupe River, Willow Glen Way, 26/Sept/75, CDFG, 25: FL 1.35 in.³²; Guadalupe River, Brokaw Road crossing, 26/Sept/75, CDFG²⁸; *Coyote River, downstream from confluence of Upper Penitencia Creek, 19/May/77, CDFG, numerous; Coyote Creek, Riverside Golf Course Road (Scoppettone and Smith, 1978: 63)²⁴; Coyote Creek, mouth of Penitencia Creek (Scoppettone and Smith, 1978: 63)²⁴; Upper Penitencia Creek at water treatment outfall near Linda Vista Road, 1/Aug/81, L&F, 6: FL 52-74 mm²⁶; Upper Penitencia Creek, 0.6 km upstream from junction with Capitol Avenue, 11/Aug/81, L&F, 2: FL 58-65 mm²⁵; Stevens Creek, 100 m upstream from gaging station, Stevens Creek

County Park, 19/Aug/81, L&F, 1: FL 251 mm³⁷; Saratoga Creek at Mission College Blvd. crossing, 21/Aug/81, L&F, 7: FL 83-157 mm³⁵; Guadalupe River, immediately above tidal margin, between Trimble Road and Montague Expressway, 31/Aug/81, L&F, 6: FL 46-257 mm²⁹; Guadalupe River at Seymore Street, San Jose, 31/Aug/81, L&F, 13: FL 40-60 mm; Coyote Creek at Hwy 237 crossing, 31/Aug/81, L&F, 10: FL 24-69 mm²³; Herbert Creek at Alamitos Road and Hicks Road crossing, 3/Sept/81, L&F, 1: FL 82 mm³⁶; Guadalupe River, 50 m upstream from Hillsdale crossing, 5/Sept/81, L&F, 10: FL 60-85 mm³⁴. SONOMA COUNTY: *Willow Brook Creek (J.D. Hopkirk, personal communication).

Notemigonus crysoleucas

Distributional Records. ALAMEDA COUNTY: Temescal Creek, Mar/55, R.T. Orr (CAS, 1)⁹; Redwood Creek, downstream from Pinehurst and Redwood Roads, Redwood Regional Park, 10/Apr/79, CDFG, 1: 3.8 in.¹⁰; Arroyo Mocho Creek, at Hopyard Road, Pleasanton, 30/Jul/81, L&F, 10: FL 52-77 mm¹¹. CONTRA COSTA COUNTY: Pinole Creek, from tidal zone 1.3 miles upstream, 23/Apr/75, CDFG (fish kill), 3: FL 4 in.⁸; Walnut Creek, 50 m upstream from confluence with Pine Creek, 5/Oct/80, L&L, 1: TL 140 mm⁴; San Ramon Creek, immediately below Creekside Drive bridge at USGS gaging station, 5/Oct/80, L&L, 2: TL 137-140 mm⁵; San Ramon Creek, 0.3 km downstream from Alamo Cemetery off La Gonda Way, 6/Oct/80, L&L, 1: TL 127 mm⁶; Moraga Creek, 25 m upstream from 1st bridge at Valle Vista along Canyon Road (T1S, R2W, Sec 19), 5/Aug/81, L&F, 2⁷. NAPA COUNTY: Napa River, 26/May/65, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 1: SL 62.5 mm); Tulacay Creek at Calif. Hwy 29 bridge on Imola Avenue (West), Napa, 22/Apr/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 4: 54-61 mm)²; Chiles Creek, immediately downstream from junction of Lower Chiles Valley Road and Chiles-Pope Valley Road, 10/Sept/81, L&F, 2: FL 57-62 mm³. SANTA CLARA COUNTY: Coyote Creek, 5/Nov/64, (SJSU, CD-24); Coyote Creek, 13/Apr/67, R.L. Hassur (SJSU); Arroyo Bayo Creek, 1.2 km E of USGS BM 1924 on San Antonio Road (T7S, R4E, Sec 5), 13/Aug/81, L&F,

9: FL 68-82 mm¹²; Saratoga Creek at Mission College Blvd., (T6S, R1W, Sec 21), 21/Aug/81, L&F, 10: FL 36-76 mm¹⁵; Guadalupe River at Branham Lane, 26/Aug/81, L&F, 3¹⁴; Guadalupe River, 50 m downstream from Hillsdale Road crossing, 5/Sept/81, L&F, 2¹³. SONOMA COUNTY: Petaluma River, 25 m upstream from Hardin Lane crossing, 16/Sept/81, L&F, 1: FL 64 mm¹.

Pimephales promelas

Distributional Records. SANTA CLARA COUNTY: Coyote Creek, Trimble Road, 28/Oct/77 (SJSU, CD-33)³; Coyote Creek at Hwy 237 crossing, 31/Aug/81, L&F, 55: FL 36-63 mm²; Coyote Creek, at Trimble Road crossing, 31/Aug/81, L&F, 88: FL 27-78 mm⁴. NAPA COUNTY: Suisun Creek, 29/Apr/63, J.D. Hopkirk and R.J. Behnke (common, reproducing naturally; J.D. Hopkirk, personal communication); Suisun Creek, off Gordon Valley Road, just below Lake Curry, 10/Aug/72, P.B. Moyle (UCDPM 72-12, 3)¹.

Pogonichthys macrolepidotus

Distributional Records. CONTRA COSTA COUNTY: San Pablo Bay at Richmond 19/Apr/74, U.S. Fish & Wildlife Service, 10 (Caywood, 1974). NAPA COUNTY: Napa River, 1897?, G.B. Culver (SU 4100, 3); Napa River, Good Luck Point, Vallejo, 2/Jul/48, U.S. Fish & Wildlife Service (CAS, Acc. 1952-III: 17, 1: SL 32 mm)²; Napa River, Good Luck Point, Vallejo, 2/Jul/48, U.S. Fish & Wildlife Service (CAS, Acc. 1952-III: 17, 7: SL 21-41 mm)³; Tulacay Creek, near mouth, Napa, 16/Mar/60, P.R. Needham and party (CAS, 7: SL 146-168 mm)⁶; Tulacay Creek, near mouth, Napa, 1/Apr/60, P.R. Needham and party (CAS 22831, 4: SL 130-156 mm)⁵; Napa Marsh, South Slough, 26/Feb/74, CDFG, 7 (Caywood, 1974); Napa Marsh, Devil's Slough, 26/Feb/74, CDFG, 2 (Caywood, 1974); Napa Marsh, Hudeman Slough, 26/Feb/74, CDFG, 7 (Caywood, 1974); Napa

Marsh, Dutchman Slough, 26/Feb/74, CDFG, 1 (Caywood, 1974); Napa River, above Bull Island, 26/May/76, CDFG, 6: FL 220-230 mm⁴. SANTA CLARA COUNTY: Coyote Creek, 1896-1898? (SU 4342, 14: SL 82-111 mm); Coyote Creek, San Jose, 1890's?, C.H. Gilbert (SU, 8)⁸; Coyote Creek (Snyder, 1905: 331). SOLANO COUNTY: Mare Island, as Pogonichthys macrolepidotum (Evermann, 1910: 132). SONOMA COUNTY: Petaluma, 1855, E. Samuels, as Pogonichthys inaequilobus (UMMZ 56278, 1: 118 mm; also Girard, 1895: 246, 8)¹; Petaluma River, mouth, 11/Apr/74, J. Baker, CSUS, 1 (Caywood, 1974).

Gila crassicauda

Distributional Records. SAN FRANCISCO COUNTY: San Francisco (Cory and L. Agassiz, 1854 and 1857; also as UMMZ 87276-77(2): 222 and 207 mm; Miller, 1963: 28). SANTA CLARA COUNTY: Coyote Creek, as Leuciscus crassicauda (Snyder, 1905: 332, also SU 21031, 85-102 mm).

Rhinichthys osculus

Distributional Records. ALAMEDA COUNTY: Alameda Creek, at junction with Calaveras Creek, 19/May/38, Shapovalov (CAS, Acc. 1952-X: 30, 1)¹; *Crow Creek, 16/Jun/60, CDFG. SANTA CLARA COUNTY: Santa Isabel Creek, Mt. Hamilton, 20/Jul/98, J.O. Snyder (SU 37823, 30)²; Santa Isabel Creek, Mt. Hamilton, 20/Jul/98, J.O. Snyder (SU 16172, 41)³; Coyote, Arroyo Hondo, and Isabel Creeks (Snyder, 1905: 337); Coyote Creek, Hwy 237 (Scoppettone and Smith, 1978: 63)⁴; Coyote Creek, near Riverside Golf Course, 1974, R.L. Hassur (Scoppettone and Smith, 1978: 64)⁵.

Lavinia exilcauda

Distributional Records. ALAMEDA COUNTY: Alameda Creek (Snyder, 1905: 331); Alameda Creek, 1934, A. Seale (Aceituno et al., 1976: 202); Alameda Creek, 14/Oct/55, W.I. Follett and G.M. Peckham (CAS, several large young)⁵⁹; Alameda Creek, 0.2 mile above WPRR bridge below Niles, in pool, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS 26162, 5: young to small adult)⁵⁷; Lake Temescal, Oakland, 27/Nov/62, R.J. Behnke and W. Francis (SOSU, 162-181, 20: SL 113-183 mm; skeletonized); Alameda Creek at Niles, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 63: SL 31-79 mm)⁵⁸; Arroyo de la Laguna Creek, 3 miles N of Sunol, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 21: SL 38-65 mm)⁵⁴; Alameda Creek, 3.4 miles upstream from bridge "1948" on Niles Canyon Road, 20/Feb/72, W.I. Follett (CAS, 1)⁶²; Alameda Creek (37°, 35'N, 121°, 59'W, elev. 12 m), 20,21/Jun/73 (Aceituno et al., 1976: 199, 8: FL 120-235 mm)⁶⁰; Alameda Creek (37°, 35'N, 121°, 55'W, elev. 55 m), 20,21/Jun/73 (Aceituno et al., 1976: 199, 1: FL 104 mm)⁶⁴; Arroyo de la Laguna Creek, downstream from bridge at Castlewood Golf Course, 16/Oct/75, CDFG, numerous⁵²; Alameda Creek (T4S, R1W, Sec 12), 16/Oct/75, CDFG⁶³; Arroyo de la Laguna Creek, downstream from bridge immediately below Castlewood Golf Course bridge, 13/Nov/75, CDFG⁵³; Arroyo de la Laguna Creek, at confluence with Alameda Creek, 4/Feb/76, CDFG, 1: FL 6.8 in.⁵⁵; Arroyo de la Laguna Creek, downstream from Hwy 680 bridge, 9/Apr/76, CDFG, 8: FL 3.25-6.25 in.⁵¹; Arroyo Valle Creek, two ponds lying immediately to the S of Shadow Cliffs Reservoir, Jul/78, CDFG⁴⁹; Altamont Creek at SPRR bridge (T2S, R3E, Sec 29), 25/Jul/81, L&L, 1: FL 85 mm⁴⁵; Altamont Creek at 2nd upstream crossing of Blue Bell Drive (T2S, R2E, Sec 34), 26/Jul/81, L&L, 14: FL 46-82 mm⁴⁴; Arroyo las Positas Creek, 200 m downstream from junction with Cayetano Creek (T3S, R2E, Sec 6), 26/Jul/81, L&L, 4: FL 47-137 mm⁴²; Arroyo las Positas Creek, 100 m upstream (above Hwy 580) from junction with Cayetano Creek, 26/Jul/81, L&L, 15: FL 76-157 mm⁴³; Arroyo

Mocho Creek, downstream from junction with Wente Road, 27/Jul/81, L&L, 24: FL 18-101 mm⁴⁸; Arroyo Mocho Creek, at junction with Hopyard Road, 30/Jul/81, L&F, 50: FL 15-104 mm⁴⁶; South San Ramon Creek, downstream from junction with Alcosta Blvd., 30/Jul/81, L&F, 5: FL 36-82 mm⁴¹; Arroyo Mocho Creek, 100 m upstream from junction with Hwy 84, 1/Aug/81, L&L, 5: FL 70-113 mm⁴⁷; Arroyo Valle Creek, upstream from junction with Hwy 84, 1/Aug/81, L&L, 6: FL 105-172 mm⁵⁰; Alameda Creek, at 1st RR crossing upstream from Niles (T4S, R1W, Sec 15), 1/Oct/81, L&F, 4: FL 25-60 mm⁶¹. CONTRA COSTA COUNTY: "Six miles back of Clayton", 3/Jul/27 (SU 60216, 5): Marsh Creek, 7.5 miles E of Mt. Diablo, 19/Feb/39, R.R. Miller and J. Davies (UMMZ 133178, 518: 27-77 mm)¹⁴; Marsh Creek, 3 miles E of Livermore, 1939, R.R. Miller and J. Davies (SSU 279, 48); Marsh Creek, ½ mile E of Marsh Creek Springs Park, 5/Sept/45, D.A. and H. Simpson (CAS 17931, 18: SL 28-40 mm)¹⁸; Lake Anza (Hopkirk, 1974: 52)⁴⁰; Marsh Creek (lat. 33°, 59', long. 121°, 42'), 20/Aug/73 (Aceituno et al., 1973, unpublished manuscript, 34: FL 39-77 mm)⁵; Marsh Creek (lat. 37°, 53', long. 121°, 46') 20/Aug/73 (Aceituno et al., 1973, unpublished manuscript, 45: FL 25-47 mm)¹²; Marsh Creek (lat. 37°, 53', long. 121°, 50'), 20/Aug/73 (Aceituno et al., 1973, unpublished manuscript, 31: FL 27-39 mm)¹³; Rodeo Creek, approximately ¼ mile below Hwy 80 near bridge on road used by flood control district, 14/Feb/74, CDFG, 6: 3-7 in.²⁹; Rodeo Creek, pool immediately downstream from Hwy 80, 14/Feb/74, CDFG, 4³⁰; Rodeo Creek, bridge over creek leading to industrial plant, 50 ft from Hwy 4, 14/Feb/74, CDFG³⁶; Rodeo Creek, at flood control natural rock drop structure downstream from Hwy 80, 20/Apr/74, CDFG, 8: FL 3.8-6.3 in.³¹; Marsh Creek, upstream from flashboard dam at Royal Oaks Golf Course, 19/Aug/75, CDFG¹⁵; Walnut Creek, pool below drop structure downstream from Bancroft Road crossing, 23/Jun/78, CDFG, approximately 100: 1-6 in.²⁴; Walnut Creek, immediately downstream from Hwy 4 crossing, 5/Oct/80, L&L, 18: TL 70-165 mm²⁰; Walnut Creek, 50 m upstream from junction with Pine Creek, 5/Oct/80, L&L, 92: TL 64-225 mm²²; Walnut Creek, 50 m upstream from

SPRR bridge at Walnut Creek Civic Center, 5/Oct/80, L&L, 1: TL 114 mm²⁵;
 San Ramon Creek, 0.3 km downstream from Alamo Cemetery off La Gonda Way,
 6/Oct/80, L&L, 25: TL 57-133 mm²⁶; San Ramon Creek, 50 m downstream from
 El Portal Road crossing opposite Alamo Cemetery, 6/Oct/80, L&L, 100: TL
 76-127 mm²⁷; Walnut Creek, at confluence with Grayson Creek, 12/Oct/80,
 L&L, 4: TL 51-127 mm¹⁹; Grayson Creek, 50 m upstream from Hwy 24 crossing,
 12/Oct/80, L&L, 17: TL 83-159 mm²¹; Marsh Creek, immediately downstream from
 junction with Hwy 4, 11/May/81, L&L, 1: FL 158 mm⁸; Marsh Creek, off Marsh
 Creek Road, approximately 0.45 km W of junction with Orchard Lane, 11/May/81,
 L&L, 3: FL 86-125 mm¹⁰; Marsh Creek, upstream from junction with Cypress Road
 (T2N, R2E, Sec 25), 22/May/81, L&L, 3: FL 148-274 mm⁶; Marsh Creek, immediately
 downstream from junction with Delta Road, 22/May/81, L&L, 8: FL 58-111 mm⁷;
 Marsh Creek, at junction with Dainty Avenue, 22/May/81, L&L, 2: FL 20 mm⁹;
 Marsh Creek, off Marsh Creek Road, approximately 0.9 km SE of junction with
 Deer Valley Road (T1S, R2E, Sec 4), 22/May/81, L&L, 150¹¹; Marsh Creek, 0.15
 km E of BM 485 on Marsh Creek Road, 22/May/81, L&L, 17¹⁶; Marsh Creek, 0.45
 km W (upstream) from BM 485 on Marsh Creek Road, 22/May/81, L&L, 8: FL
 30-40 mm¹⁷; Rodeo Creek, upstream from junction with 2nd Street, 18/Jun/81,
 L&F, 50: FL 94-312 mm²⁸; Rodeo Creek, 0.5 km upstream from Hwy 80 crossing,
 18/Jun/81, L&F, 1000: FL 50-119 mm³²; Rodeo Creek, pool below drop structure,
 50 m downstream from SFRR crossing, 18/Jun/81, L&F, 60: FL 45-140 mm³³;
 Rodeo Creek, pool immediately downstream from SFRR crossing, 18/Jun/81, L&F,
 3: FL 37-47 mm³⁴; Rodeo Creek, 75 m upstream from junction with SFRR crossing,
 18/Jun/81, L&F, 50: FL 40-80 mm³⁵; Moraga Creek, 25 m upstream from Valle
 Vista Bridge along Canyon Road (T1S, R2W, Sec 19), 5/Aug/81, L&F, 260: FL
 40-61 mm³⁷; Moraga Creek, at junction of Old Moraga Way, 5/Aug/81, L&F, 3:
 FL 64-92 mm³⁹; Moraga Creek, 0.2 km upstream from junction with Canyon Road
 near Moraga School, 7/Aug/81, L&F, 15: FL 47-75 mm³⁸; Pine Creek, at end of
 Robin Lane, Concord, 21/Sept/81, L&F, 25: FL 21-124 mm²³. NAPA COUNTY:
 Napa River, Calistoga (Snyder, 1908: 158)¹; Suisun Creek, near Lake Curry,

4 miles NW of Manka, overflow pool along the stream, 3/Mar/40, T. Rodgers (UMMZ 131516, 8: 65-175 mm)³; Suisun Creek, off Gordon Valley Road, just below Lake Curry, 10/Aug/72, P.B. Moyle (UCDPM 72-12, 15)². SANTA CLARA COUNTY: Coyote Creek, 1897?, C.H. Gilbert (SU 4219, 19); Coyote Creek (Snyder 1905: 331); Coyote Creek, 5/Nov/64 (SJSU, CD-30); Coyote Creek, 7/Mar/72, R.L. Hassur (SJSU); Coyote Creek (37°, 19'N, 121°, 51'W, elev. 30 m), 21/Jun/73 (Aceituno et al., 1976: 203, 3: FL 67-83 mm)⁶⁸; Coyote Creek (37°, 13'N, 121°, 45'W, elev. 58 m), 21/Jun/73 (Aceituno et al., 1976: 203, 5: FL 67-181 mm)⁷⁸; Coyote Creek (37°, 10'N, 121°, 38'W, elev. 116 m), 21/Jun/73 (Aceituno et al., 1976: 201, 2: FL 124-142 mm)⁸²; *Berryessa Creek, several miles upstream from mouth, 27/Jun/75, CDFG, 3; *Lower Silver Creek, from middle reach of stream to mouth, 16/Jul/75, CDFG, 2; Coyote Creek, Hwy 101 bridge at Hellyer County Park, approximately 75 yds upstream and downstream of the bridge, 23/Sept/75, CDFG, 11: FL 2-3.5 in.⁷⁴; Coyote Creek, northern portion of Hellyer Park downstream from Sylvandale Road, 23/Sept/75, CDFG, 3: FL 2-2.5 in.⁷⁵; Coyote Creek, Singleton Road, downstream, 23/Sept/75, CDFG, 12: FL 2-2.5 in.⁷²; Coyote Creek, 100 yds below Berryessa Road, 23/Sept/75, CDFG, 33: FL 1-6 in.⁶⁹; Coyote Creek, 100 yds upstream from Oakland Road bridge, near San Jose Municipiple Golf Course, 23/Sept/75, CDFG, 15: FL 1-3 in.⁷⁰; Coyote Creek, Hwy 237, 75 yds upstream and downstream from bridge, 23/Sept/75, CDFG, 4: FL 1-4 in.⁶⁵; *Stevens Creek, below Hwy 101, 29/Dec/75, CDFG; Coyote Creek, downstream from confluence of Upper Penitencia Creek, 19/May/77, CDFG, numerous; Stevens Creek, 150 yds S of Hwy 101, 8/May/78, CDFG, 6⁸⁹; Coyote Creek, below Coyote Reservoir (Scoppettone and Smith, 1978: 63)⁸⁵; Coyote Creek, below Anderson Reservoir (Scoppettone and Smith, 1978: 63)⁸³; Coyote Creek, above percolation ponds, 2 km below Anderson Reservoir (Scoppettone and Smith, 1978: 63)⁸⁴; Coyote Creek, Riverside Golf Course (Scoppettone and Smith, 1978: 63)⁸¹; Coyote Creek, upstream from Metcalf Road (Scoppettone and Smith, 1978: 63)⁷⁹; Coyote Creek, Tennant Road (Scoppettone and Smith, 1978: 63)⁷⁷; Coyote Creek, above and below Hellyer Park (Scoppettone and Smith, 1978:

63)⁷⁶; Coyote Creek, Singleton Road (Scoppettone and Smith, 1978: 63)⁷³;
 Coyote Creek, mouth of Penitencia Creek (Scoppettone and Smith, 1978: 63)⁷¹;
 Coyote Creek, Hwy. 237 (Scoppettone and Smith, 1978: 63)⁶⁶; Upper Penitencia
 Creek, 0.6 km upstream from junction with Capital Avenue, 11/Aug/81, L&F,
 2: FL 55-58 mm⁸⁶; Upper Penitencia Creek, at upstream junction with Maybury
 Road, 11/Aug/81, L&F, 5: FL 42-70 mm⁸⁷; Saratoga Creek, below junction of
 Saratoga and San Tomas Aquinas Creeks at Mission College Blvd., 21/Aug/81,
 L&F, 200: FL 23-111 mm⁸⁸; Coyote Creek, at Trimble Road crossing, 31/Aug/81,
 L&F, 2: FL 67-78 mm⁶⁷; Coyote Creek, at El Parque de la Raza at canal input,
 1/Sept/81, L&F, 26: FL 50-95 mm⁷⁸; Coyote Creek, 0.75 km upstream from Coyote
 (town) on wildlife reserve park, 3/Sept/81, L&F, 22: FL 56-115 mm⁸⁰;
 Fisher Creek at Bailey Avenue crossing, 5/Sept/81, L&F, 3: FL 82-92 mm⁹⁰.
 SOLANO COUNTY: Suisun Creek, at Suisun Valley Road crossing, immediately
 before turnoff to Twin Sisters Gun Club, 2/Oct/81, L&L, 2: FL 65-85 mm⁴.

Mylopharodon conocephalus

Distributional Records. NAPA COUNTY: Napa River, Yount Mill Road,
 20/Oct/72, P.B. Moyle (UCDPM, 72-24, 2)³³. SAN FRANCISCO COUNTY: San
 Francisco, as Mylopharodon robustus (Girard, 1857: 27); "San Francisco
 market, rare" (Eigenmann, 1890: 57).

Orthodon microlepidotus

Distributional Records. ALAMEDA COUNTY: Alameda Creek, 16/Sept/34, A. Seale (SU 7406, 10: SL 20-96 mm); Alameda Creek, between Niles and bridge just E of Sunol, 25/Feb/39, R.R. Miller and G. Murphy (UMMZ 133179, 1: 40 mm)⁵; Alameda Creek, Niles, below WPRR bridge, 14/Oct/55, W.I. Follett and G.R. Peckham (CAS 26156, 66: SL 28-67 mm)¹⁷; Alameda Creek, 0.2 mile above WPRR bridge below Niles, 14/Oct/55, W.I. Follett and G.M. Peckham (CAS 26161, 34: SL 112-394 mm)¹⁸; Alameda Creek, ca. 100 yds below SPRR bridge, Niles, 14/Oct/55, W.I. Follett and G.M. Peckham (CAS, Acc. 1955-X: 31, 1: adult)¹¹; Alameda Creek, pools opposite Niles Nursery, 25/Mar/57, W.I. Follett and G.M. Peckham (CAS 26258, 4: large young to adult)¹²; Alameda Creek, pool at Niles Sand and Gravel Co., 22/Apr/57, W.I. Follett and G.M. Peckham (CAS 26728, 16: young to adult)¹³; Alameda Creek, 0.2 mile above bridge of new freeway, 0.4 mile above old Calif. Hwy 17, W.I. Follett and G.M. Peckham (CAS 26285, 60: young to small adult)¹⁵; Alameda Creek, 0.2 mile above Calif. Hwy 17, just above new freeway bridge, 21/Jul/57, W.I. Follett and G.M. Peckham (CAS 26290, 10: young to half-grown)¹⁶; Alameda Creek, 2/Jul/58, G.M. Peckham (CAS, 2); Alameda Creek, near Niles nursery, 31/Oct/58, W.I. Follett and G.M. Peckham (CAS, many)¹⁴; Alameda Creek, between Niles and Sunol, 18/Aug/61, J.D. Hopkirk and party (CAS, 22884, 6: SL 193-220 mm)⁶; Alameda Creek, at Niles, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 34: SL 38-77 mm)²⁰; Creek tributary to Alameda Creek, Lowry Road and SPRR crossing, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-V: 20, 8: SL 48-76 mm)¹⁹; Kaiser Borrow Pits, will be called "Shadow Cliffs", Pleasanton, 19/Mar/70, W.E. Strocchein (CAS 39825, 1: large adult)³; Alameda Creek, Niles Canyon, picnic ground at railroad bridge, 20/Feb/72, W.I. Follett (CAS, 1: small)⁸; Alameda Creek, Niles Canyon, 0.3 mile downstream (west) from picnic ground at railroad bridge, 20/Feb/72, W.I. Follett (CAS, 1)⁹; Alameda Creek, Niles Canyon, 0.4 mile downstream (west) from

picnic ground at railroad bridge (above flattish dam), 20/Feb/72, W.I. Follett (CAS, 2)¹⁰; Alameda Creek (lat. 37°, 34', long. 121°, 59', elev. 12 m), 20,21/Jun/73 (Aceituno et al., 1976: 199, 10: FL 41-322 mm)⁷; Arroyo Valle Creek, two ponds lying immediately to the S of Shadow Criffs Reservoir, Jul/78, CDFG⁴. CONTRA COSTA COUNTY: Walnut Creek, 50 m upstream from junction with Pine Creek, 5/Oct/80, L&L, 1: TL 216 mm¹; Pine Creek at end of Robin Lane, Concord, 21/Sept/81, L&F, 5: FL 59-172 mm². SAN FRANCISCO COUNTY: San Francisco (Girard, 1857: 28). SANTA CLARA COUNTY: Coyote Creek (Snyder, 1905: 331); Coyote Creek, San Jose (inside city), 1/Oct/22, C.L. Hubbs (UMMZ 63411, 31: 40-104 mm)²²; Coyote Creek, at bridge opposite Milpitas, 16/Oct/32, W.I. Follett and party (CAS)²¹; Coyote Creek (Fry, 1936: 67); Lower Coyote Creek (Fry, 1936: 67); Coyote Creek, 300 yds below Coyote dam at Coyote Lake, 23/Aug/45, D.A. and H. Simpson (CAS 13265, 1: SL 57 mm)³²; Coyote River, on Hwy 101, 1.5 miles N of Coyote at concrete dam, 24/Aug/45, D.A. and H. Simpson (CAS 13278, 16: 19-73 mm)²⁹; Coyote River, about 6 miles S of San Jose near stone quarry, 24/Aug/45, D.A. and H. Simpson (CAS 13275, 9: 23-45 mm)²⁵; Coyote Creek drainage, 1948 (SJSU, CD-2); Coyote Creek at U.S. 101 crossing (T7S, R2E, Sec 31), 24/Jul/53, T.J. Merkel (CAS, Acc. 1953-X: 20, 1)²³; Coyote Creek drainage, 3/Mar/64 (SJSU, CD-23); *Coyote Creek, from Coyote Reservoir upstream 8.2 miles to center of Sec 24 of T9S, R4E, 18/Mar/65, CDFG, 20: 7-9 in.; Coyote Creek, 7/Mar/72, R.L. Hassur (SJSU); Coyote Creek (lat. 37°, 13', long. 121°, 45', elev. 58 m), 21/Jun/73 (Aceituno et al., 1976: 203, 8: FL 32-223 mm)²⁸; Coyote Creek, Riverside Golf Course (Scoppettone and Smith, 1978: 63)³⁰; Coyote Creek, Tennant Road (Scoppettone and Smith, 1978: 63)²⁷; Coyote Creek, 0.75 km upstream from town of Coyote on wildlife reserve, 3/Sept/81, L&F, 13: FL 65-104 mm²⁷; Coyote Creek, 25 m upstream from junction with Metcalf Road, 3/Sept/81, L&F, 1: FL 105 mm²⁶; Fisher Creek, at Bailey Avenue crossing, 5/Sept/81, L&F, 2: FL 147-152 mm³¹. SONOMA COUNTY: Willow Brook Creek, at Penngrrove and at northern limits of Petaluma, J.D. Hopkirk (personal communication).

Ptychocheilus grandis

Distributional Records. ALAMEDA COUNTY: [Alameda Creek], Sunol, 15/Jun/98, J.O. Snyder (CNHM 2574: 9 halfgrown to small adults; J.D. Hopkirk, personal communication); Alameda Creek (Snyder, 1905: 331); Alameda Creek, Niles Canyon, 4/May/27 (SU 59793, 2)⁵⁸; Alameda Creek, immediately below dam in Niles Canyon, 24/Jul/27, W.I. Follett, several small⁵⁹; Alameda Creek, 9/Sept/34 (Seale, 1934: 152); Alameda Creek, between Niles and bridge just E of Sunol, 25/Feb/39, R.R. Miller and G. Murphy (UMMZ 133180, 24: 28-129 mm)⁶¹; Alameda Creek, Niles (CAS, 3: SL 39-87 mm); Alameda Creek, dredger ponds at Niles, 23/Jan/53, W.I. Follett and G.M. Peckham (CAS, 25735, 1)⁷¹; Alameda Creek, 29/Jul/56, G.M. Peckham (CAS, Acc. 1956-VIII: 7: 1), Alameda Creek, pools opposite Niles nursery, 25/Mar/57, W.I. Follett and G.M. Peckham (CAS 26259, 3)⁷²; Alameda Creek, 0.4 mile above old Calif. Hwy 17, 0.2 mile above bridge of new freeway, 21/Jul/57, W.I. Follett and G.M. Peckham (CAS 26286, 1)⁷⁴; Alameda Creek, 0.2 mile above bridge of new freeway near Niles, 21/Aug/57, W.I. Follett and G.M. Peckham (CAS 26291, 1)⁷³; Alameda Creek, near Hwy bridge E of Niles, 2/Sept/61, J.D. Hopkirk, S. Mathews, R. Behnke (CAS 22879, 3: SL 39-87 mm)⁶⁸; Alameda Creek, at Niles, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 46: SL 30-61 mm)⁶⁹; Arroyo de la Laguna Creek, 3 miles N of Sunol, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 1: SL 33 mm)⁵³; Alameda Creek, Niles Canyon, 21/Oct/67, G. Barlow and party (CAS, Acc. 1969: 20, 60); Alameda Creek, Niles Canyon, 0.3 mile downstream from picnic ground at railroad bridge, 20/Feb/72, W.I. Follett, 1⁶²; Alameda Creek, Niles Canyon, 0.4 mile downstream from picnic ground at railroad bridge above flattish dam, 20/Feb/72, W.I. Follett, 1: adult⁶³; Alameda Creek, Niles Canyon, 3.4 miles upstream from bridge "1948", 20/Feb/72, W.I. Follett, 3⁶⁶; Alameda Creek (lat. 37°, 34', long. 121°, 59'), 20,21/Jun/73 (Aceituno et al., 1976: 199, 2: FL 252-397 mm)⁷⁰; Crow Creek, E of 4821 Crow Canyon Road, Hayward 8/Jul/75, CDFG⁷⁵; Alameda Creek (T4S, R1W, Sec 12), 16/Oct/75, CDFG⁶⁴; Arroyo Valle Creek, two ponds lying immediately to the S of Shadow Cliffs Reservoir, Jul/78, CDFG⁵¹; Alameda Creek, Sunol Park Headquarters (Scoppettone

and Smith, 1978: 64)⁵⁵; Arroyo Mocho Creek, at junction with Hopyard Road, Pleasanton, 30/Jul/81, L&F, 1: FL 113 mm⁵⁰; Arroyo Valle Creek, upstream from junction with Hwy 84, 1/Aug/81, L&L, 1: FL 156 mm⁵²; Arroyo de la Laguna Creek, at 2nd bridge downstream from Castlewood Golf Course near BM 303, 3/Aug/81, L&F, 7: FL 21-52 mm⁵⁴; Alameda Creek, opposite Sunol Regional Wilderness headquarters, immediately below swimming hole dam (T5S, R2E, Sec 17), 6/Aug/81, L&F, 27: FL 90-301 mm⁵⁷; Alameda Creek, Sunol Regional Wilderness headquarters, 6/Aug/81, L&F, 14: FL 98-220 mm⁵⁶; Alameda Creek, below spillway at USGS gaging station (T4S, R1E, Sec 7), 1/Oct/81, L&F, 7: FL 53-92 mm⁶⁰; Alameda Creek, opposite Kaiser aggregate quarry (T4S, R1W, Sec 12), 1/Oct/81, L&F, 9: FL 55-92 mm⁶⁵; Alameda Creek, at 1st railroad crossing upstream from Niles (T4S, R1W, Sec 15), 1/Oct/81, L&F, 6: FL 42-78 mm⁶⁷. CONTRA COSTA COUNTY: Livermore?, 8/Jul/31 (SU 11666, 1); Rodeo Creek, 0.25 mile below Hwy 80, near bridge on road used by flood control district, 14/Feb/74, CDFG, 32: fingerlings⁴¹; Rodeo Creek, pool immediately downstream from Hwy 80 bridge, 14/Feb/74, CDFG, 1⁴²; Rodeo Creek, at flood control natural rock drop structure, downstream from Hwy 80, 20/Mar/74, CDFG, 23: FL 2.4-14.0 in.⁴⁰; Pinole Creek, from tidal zone upstream 1.3 miles, 23/Apr/75, CDFG, 24: FL 6-8 in.⁴³; Walnut Creek, immediately downstream from Hwy 4 crossing, 5/Oct/80, L&L, 1: TL 229 mm³⁷; Walnut Creek, 50 m upstream from junction with Pine Creek, 5/Oct/80, L&L, 3: TL 191-280 mm³⁸; Walnut Creek, at confluence with Grayson Creek, 12/Oct/81, L&L, 1: TL 254 mm³⁶; Marsh Creek, immediately upstream from Cypress Road crossing, 22/May/81, L&L, 5: FL 86-129 mm³⁵; Rodeo Creek, immediately upstream from 2nd Street crossing, 18/Jun/81, L&F, 10: FL 141-232 mm³⁹; Pinole Creek 100 m upstream from culvert under San Pablo Avenue, 23/Jun/81, L&F, 2: FL 235-270 mm⁴⁴; Pinole Creek, 50 m upstream from junction with Hwy 80, 23/Jun/81, L&F, 4⁴⁵; Pinole Creek, 175 m upstream from junction with Hwy 80, 23/Jun/81, L&F, 7⁴⁶; Garrity Creek, 1 km upstream from 2nd railroad crossing (T2N, R4W, Sec 20), 7/Jul/81, L&F, 5: FL 123-278 mm⁴⁹; San Pablo Creek, opposite Rancho School, El Sobrante, 13/Jun/81, L&F, 2: FL 106-121 mm⁴⁸; San Pablo Creek, upstream 30 m from bridge to St. Joseph Cemetery, 13/Jul/81, L&F, 1: FL 231 mm⁴⁷. MARIN COUNTY: Corte Madera Creek,

Lagunitas Road bridge, just W of Ross City Hall, 1/Nov/63, SFSU (CAS 24726, 1: SL 64 mm)¹; Novato Creek, at junction with 7th Street, 16/Sept/81, L&F, 1: FL 278 mm². NAPA COUNTY: Napa River, Calistoga (Snyder, 1908: 158)⁵; Conn Creek (Snyder, 1908: 258); Suisun Creek, large pools at the foot of the spillway of Lake Curry (Shapovalov, 1940: 13)³²; Napa River, 2 miles below Calistoga, 1/Aug/43, G. Murphy (SU 40811, 2)⁶; Conn Creek, pool just above dam under construction, 13/Sept/45, B. Curtis (CAS 20944, 1)²⁷; Lake Hennessey (Conn Valley Reservoir), 1/May/50, B Curtis (CAS 23080, 1: SL 209 mm); Chiles Creek, near mouth of Conn Reservoir, 5/May/51, P.R. Needham and Zoology 138 class (CAS 24727, 1: SL 195 mm)²⁸; Creek near Yountville, in old soldiers home, tributary to Napa River, 31/Aug/58, E.W. Kirschbaum, T. Boud, and D. Rentz (CAS, Acc. 1958-VIII: 9,3); Tulacay Creek near junction with Napa River, 4/May/59, P.R. Needham and party (CAS 23826, 3)²⁰; Tulacay Creek, near Imola Avenue (West), Napa, 12/May/60, J.D. Hopkirk and J. Shimizu (CAS, Acc. 1962-VII: 13, 1: 97 mm)²¹; Napa River, Napa, 30/May/63, J.D. Hopkirk, J. Shimizu, and A. Ota (CAS 23270, 4: SL 62-97 mm)³⁰; Tulacay Creek, near mouth (upstream from railroad bridge), S of Imola Avenue (West), 26/May/65, J.D. Hopkirk, J. Shimizu, D.H. Evans (CAS 24729, 2: SL 136-139 mm)²²; Napa River, 26/May/65, J.D. Hopkirk, J. Shimizu, and D.H. Evans (CAS, Acc. 1966-VI: 20, 1: SL 74.4 mm)²⁴; Tulacay Creek, at Calif. 29 bridge on Imola Avenue West, Napa, 22/Apr/66, A.M. Kuris, R. Berta and J.D. Hopkirk (CAS, Acc. 1966-VI: 20, 1: 113 mm)²³; *Bell Canyon Creek, Bell Canyon Dam to mouth, 20/Jun/69, CDFG; Napa River, at Yountville Cross Road, 28/Jul/69, CDFG¹³; Napa River, Hwy 128 bridge, 29/Jul/69, CDFG¹²; Napa River, at Zinfandel Lane bridge, 29/Jul/69, CDFG¹¹; Napa River, at Pratt Avenue bridge, 31/Jul/69, CDFG⁹; Napa River, at Bale Avenue bridge, 15/Aug/69, CDFG⁸; Napa River, at Berry Avenue bridge, 8/Aug/69, CDFG⁷; Napa River, Yount Mill Road, 20/Oct/72, P.B. Moyle (UCDPM, 72-24, 2)¹⁶; Napa River, Yountville Cross Road, 20/Oct/72, P.B. Moyle (UCDPM, 72-23, 20)¹⁵; Napa River, 0.5 mile section upstream from the Lincoln Avenue bridge in Napa, 1/Nov/73, CDFG, 1: FL 288 mm¹⁷; Napa River, from Deer Park Road 1/3 mile below Pope Street bridge, 16,17/Oct/79, CDFG (fish kill), 340¹⁰; Conn Creek, 1.5 miles above Lake Hennessey, 9/Sept/81, L&F, 3: FL 32-64 mm²⁶;

Napa River, at Yountville Cross Road, 10/Sept/81, L&F, 48: FL 61-262 mm¹⁴;
 Redwood Creek, on Redwood Road, 0.25 mile downstream from junction with
 Brown's Valley Road, 10/Sept/81, L&F, 2: FL 47-52 mm¹⁹; Chiles Creek, 0.25 mile
 upstream from junction with Moore Creek, 10/Sept/81, L&F, 2: FL 48-64 mm²⁹;
 Tulacay Creek, 50 m upstream from Soscol Avenue crossing, Napa, 12/Sept/81,
 L&F, 5: FL 160-203 mm²⁵; Milliken Creek, at West Trancas Road crossing,
 12/Sept/81, L&F, 2: FL 50-60 mm³¹. SAN FRANCISCO COUNTY: San Francisco
 (Girard, 1857: 31). SAN MATEO COUNTY: San Francisquito Creek (Snyder, 1905:
 331)¹⁰⁹. SANTA CLARA COUNTY: Coyote Creek (Snyder, 1905: 331); Guadalupe
 Creek, San Jose (in city), 30/Sept/22, C.L. Hubbs (UMMZ 63409, 1: 60)¹¹⁰;
 Coyote Creek, in the city of San Jose, 1/Oct/22, C.L. Hubbs (UMMZ 63410,
 15: 45-75 mm)¹¹¹; Coyote Creek, near Madrone, 5/Dec/26, D.H. Fry (SU 59709,
 82: cf. Fry, 1936: 67)⁸⁶; Coyote Creek, near Madrone, 5/Dec/26, D.H. Fry
 (SU 21; cf. Taft, 1928; Fry, 1936: 67; Taft and Murphy, 1950: 154, 259)⁸⁷.
 Coyote Creek, Madrone, 12/Feb/27 (Taft, 1928; Taft and Murphy, 1950: 154,
 1)⁹⁴; Coyote Creek, near Madrone bridge, 13/Feb/27, A.C. Taft (SU 37887, 75;
 cf. Taft, 1928; Taft and Murphy, 1950: 154)⁹²; Coyote Creek, at Madrone
 bridge, 25/May/27, A.C. Taft (SU 20802, 5)⁸⁸; Coyote Creek, Madrone, 24/Jun/27
 (Taft, 1928; cf. Taft and Murphy, 1950: 154, 1)⁹⁵; Coyote Creek above Madrone
 bridge, 8/Jul/27, A.C. Taft (SU 37883, 125; cf. Taft, 1928; Taft and Murphy,
 1950: 154, 22)⁹⁷; Coyote Creek, above Madrone swimming hole, 11/Oct/27,
 D.H. Fry (SU 37882, 8; cf. Fry, 1936: 67)⁸⁹; Coyote Creek, Madrone, 25/Oct/27
 (Taft, 1928; cf. Taft and Murphy, 1950: 154, 71)⁹⁸; Coyote Creek, Madrone
 Hot Springs (Taft, 1928; cf. Taft and Murphy, 1950: 154, 19)⁹⁹; Coyote
 Creek, near Madrone, 20/Feb/28, A.C. Taft (SU 24568, 27: cf. Taft, 1928;
 Taft and Murphy, 1950: 154, 67)⁹³; Coyote Creek, Madrone, D.H. Fry (SU 37886,
 44: cf. Taft, 1928; Fry, 1936: 67; Taft and Murphy, 1950: 154, 74)⁹¹; Coyote
 Creek, at Calif. Hwy 9 opposite Milpitas, 2/Aug/44, W.I. Follett (lat. 37°,
 25', 20"N, long. 121°, 55', 30"W, elev. 20') (CAS 18605, 2)¹⁰⁷; Coyote
 River, at junction of Cochran Road and Malaguira Road, between Madrone and
 Morgan Hill, 24/Aug/45, D.A. and H. Simpson (CAS 13270, 30: 17-88 mm)¹⁰⁰;
 Coyote River, about 6 miles S of San Jose near stone quarry, 24/Aug/45, D.A.

and H. Simpson (CAS 13272, 3: 33-62 mm)¹⁰⁴; Coyote River, on Hwy 101, 1.5 miles N of Coyote at concrete dam, 24/Aug/45, D.A. and H. Simpson (CAS 13279, 3: 42-47 mm)¹⁰⁵; Coyote River, on Hwy 101 at old service station at North Coyote, 24/Aug/45, D.A. and H. Simpson (CAS 13281, 2: 52-55 mm)¹⁰²; Coyote River, at North Coyote, just S of junction of unnamed creek on E side of Hwy 101, 25/Aug/45, D.A. and H. Simpson (CAS 13284, 12: 42-59 mm)¹⁰¹; Coyote River, 25/Aug/45, D.A. Simpson (CAS 18727, 3: 53-76 mm); Coyote Creek, 2.4 miles downstream from junction of Gilroy Hot Springs Road and Canada Road (T10S, R4E, Sec 11), 23/Jul/53, T.J. Merkel (CAS 20971, 5)⁸⁴; Coyote Creek drainage, 29/Oct/54 (SJSU, CD-3); Coyote Creek drainage, Nov/54, (SJSU, CD-7); Coyote Creek drainage, 23/Nov/55 (SJSU, CD-11, 12); Coyote Creek, above bridge 0.8 mile below Gilroy Hot Springs, 12/May/64, W.I. Follett (CAS, 3)⁸¹; *Coyote Creek, from confluence with Coyote Reservoir upstream 8.2 miles to center of Sec 24 of T9S, R4E, 18/Mar/65, CDFG, 12: 8-14 in.; Coyote Creek (Guzzetta, 1974: 28)⁷⁶; Coyote Creek, middle fork (Guzzetta, 1974: 28)⁷⁷; Coyote Creek, E fork (Guzzetta, 1974: 28)⁷⁸; Coyote Creek, middle fork, Coe State Park (Scoppettone and Smith, 1978: 63)⁸⁰; Coyote Creek, 2 km downstream from Gilroy Hot Springs (Scoppettone and Smith, 1978: 63)⁸²; Coyote Creek, below Coyote Reservoir (Scoppettone and Smith, 1978: 63)⁸⁵; Stevens Creek, 100 m upstream from gaging station at Stevens Creek County Park (T7S, R2W, Sec 22), 19/Aug/81, L&F, 2: FL 50-53 mm)¹⁰⁸; Coyote Creek, at El Parque de la Raza, at canal input, 1/Sept/81, L&F, 1: FL 53 mm¹⁰⁶; Coyote Creek, 25 m upstream from Metcalf Road crossing, 3/Sept/81, L&F, 1: FL 27 mm¹⁰³; Coyote Creek, 6.12 miles E on Gilroy Hot Springs Road from junction with Canada Road (T10S, R5E, Sec 6), 5/Sept/81, L&F, 4: FL 40-102 mm⁸³. SOLANO COUNTY: Mare Island, listed as Ptychocheilus harfordi (Evermann and Latimer, 1910: 133)³⁴; Suisun Creek, at Suisun Valley Road crossing, immediately before Twin Sisters Gun Club turnoff (T5N, R2W, Sec 7), 2/Oct/81, L&L, 9: FL 50-131 mm³³. SONOMA COUNTY: Sonoma Creek, at Sonoma, 24/Jan/63, J.D. Hopkirk and party (CAS 23255, 1: SL 75 mm)³; *Sonoma Creek, pool 0.25 miles below Madrone Road bridge, 7/Apr/77, CDFG, many; Sonoma Creek, at junction with West Watmaugh Road, 15/Sept/81, L&F, 25: FL 37-73 mm⁴.

Lavinia symmetricus

Distributional Records. ALAMEDA COUNTY: Alameda Creek, at Sunol, 15/Jun/98, J.O. Snyder (SU 15974, 29)¹⁴⁶; Alameda Creek, as Rutilus symmetricus (Snyder, 1905: 332)¹⁴⁷; Alameda Creek, Niles Canyon, 7/May/27 (SU 59795, 3); Alameda Creek (Seale, 1934: 152); Alameda Creek, 19/May/38, L. Shapovalov (CAS, Acc. 1952-X: 30, 27); Alameda Creek, between Niles and bridge just E of Sunol, 25/Feb/39, R.R. Miller and G. Murphy (UMMZ 133181, 108: 21-51 mm); Arroyo Mocho Creek, a few miles SE of Livermore, 20/May/39, Calhoun and Helm (SU 37848, 29)¹²⁴; Arroyo Mocho Creek, about 10 miles SE of Livermore, 1/Oct/39 (SU 59822, 14)¹³⁰; Arroyo Mocho [Creek], 6.25 miles SE of Livermore, 1942 (SU 40798)¹²⁷; Arroyo Mocho Creek, 5 airline miles SE of Livermore, 19/Dec/42, G. Murphy (SU 40799), 52¹²⁶; Alameda Creek (Murphy, 1943: 187); San Lorenzo Creek, near Hayward High School, 1/Sept/52, M. Pitman (SU, 2)¹¹²; Crow Creek, Jun-Jul/54, G. Peckham (CAS, Acc. 1954-IX: 16, 14); Alameda Creek, pools opposite Niles nursery (Calif. Nursery Co.), 25/Mar/57, W.I. Follett and G.M. Peckham (CAS 26260, 1: adult)¹⁵²; Alameda Creek, 0.4 mile above old Calif. Hwy 17, 0.2 mile above bridge of new fwy, 21/Jul/57, W.I. Follett and G.M. Peckham (CAS 26287, 1: adult)¹⁵³; *Crow Creek, 16/Jun/60, CDFG; Alameda Creek, near hwy bridge E of Niles, 18/Aug/61, J.D. Hopkirk, S. Mathews, and T. Behnke (CAS 22880, 85)¹⁵⁴; Alameda Creek, at Niles, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 58: SL 31-78 mm)¹⁵⁵; Arroyo de la Laguna Creek, 3 miles N of Sunol, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 5: SL 30-73 mm)¹³⁸; *Crow Creek, from Bolinas Creek to mouth, 5,6/Aug/75, CDFG; *San Lorenzo Creek, immediately below Don Castro Reservoir to concrete channel, 20/Aug/75, CDFG; *Arroyo de la Laguna Creek, bridge at Castlewood Golf Course, downstream, 16/Oct/75, CDFG; Alameda Creek (T4N, R1W, Sec 12), 16/Oct/75, CDFG¹⁴⁸; Alameda Creek, railroad trestle bridge, 1 mile N of Niles, 19/Oct/75, G.W. Barlow and class (UCB 37561, 76)¹⁵⁰; Arroyo Mocho Creek, Lawrence Laboratory pumping station (NE¼ of Sec 8, T4S, R3E), 3/Feb/76, CDFG, 25: FL 40-80 mm¹²⁸; Arroyo Mocho Creek, at Cedar Brook Ranch (SW¼ of Sec 14, T4S, R3E), 3/Feb/76, CDFG, numerous¹²⁹; Arroyo Mocho Creek, Mines Road, 0.5

mile above intersection with Del Valle Road (NW¼ of Sec 6, T4S, R3E)
 3/Feb/76, CDFG, 8: FL 37-130 mm¹³¹; Arroyo de la Laguna Creek, 150 yds up-
 stream from confluence with Alameda Creek, 4/Feb/76, CDFG, 2: FL 48-53 mm¹⁴⁰;
 Arroyo de la Laguna Creek, at confluence with Alameda Creek, 4/Feb/76, CDFG,
 numerous: FL 42-65 mm¹⁴¹; Alameda Creek, milepost 5, Ohlone Camp Road (Scop-
 pettone and Smith, 1978: 63)¹⁴⁵; Alameda Creek, 0.5 km upstream from junction
 with Calaveras Creek (Scoppettone and Smith, 1978: 64)¹⁴⁴; Alameda Creek,
 Sunol Park Headquarters (Scoppettone and Smith, 1978: 64)¹⁴²; Arroyo de la
 Laguna Creek, near mouth (Scoppettone and Smith, 1978: 64)¹³⁹; Arroyo Mocho
 Creek, Lawrence Laboratory pumping station (Scoppettone and Smith, 1978: 64)¹³²;
 Arroyo Mocho Creek, 1 km above Del Valle Road (Scoppettone and Smith, 1978:
 64)¹³³; San Lorenzo Creek, at junction with 2nd Street, opposite Hayward
 City Hall, 23/Jul/81, L&F, 150: FL 51-101 mm¹¹⁵; San Lorenzo Creek, 250 m up-
 stream from junction with 2nd Street, Hayward, 23/Jul/81, L&F, 16: FL 61-76
 mm¹¹⁶; San Lorenzo Creek, 300 m upstream from junction with 2nd Street, Hayward,
 23/Jul/81, L&F, 10: FL 57-70 mm¹¹⁷; San Lorenzo Creek, 30 m downstream from junc-
 tion of north and middle forks, 0.4 km downstream from junction of Grove Way,
 24/Jul/81, L&F, 50: FL 21-80 mm; San Lorenzo Creek, at junction of north and mid-
 dle forks, below junction of Grove Way, 24/Jul/81, L&F, 100: FL 27-113 mm¹¹³;
 San Lorenzo Creek, 50 m downstream from junction with Crow Creek, 24/Jul/81,
 L&F, 21: FL 23-82 mm¹⁰⁷; San Lorenzo Creek, N branch at junction of Grove Way,
 24/Jul/81, L&F, 27: FL 27-88 mm¹¹⁴; San Lorenzo Creek, 30 m downstream from junc-
 tion with B Street bridge, 25/Jul/81, L&L, 23: FL 75-84 mm¹¹⁰; San Lorenzo Creek,
 50 m upstream from junction with B Street bridge, 25/Jul/81, L&L, 9: FL 66-95
 mm¹¹¹; San Lorenzo Creek, pool immediately below Cull Canyon Reservoir, 25/Jul/81,
 L&L, 7: FL 53-73 mm¹⁰⁸; San Lorenzo Creek, 100 m upstream from junction with Inter-
 state 580, 25/Jul/81, L&L, 8: FL 57-84 mm¹⁰⁹; Crow Creek, approximately 1 mile up-
 stream from junction with Cull Canyon Road and Crow Canyon Road, at 2nd crossing on
 Crow Canyon Road, 25/Jul/81, L&L, 38: FL 45-114 mm¹⁰⁶; Crow Creek, approximately 1.6
 miles upstream from junction of Cull Canyon Road and Crow Canyon Road, 25/Jul/81,
 L&L, 30: FL 28-105 mm¹⁰⁷; Arroyo Mocho Creek, approximately 2.7 km upstream from
 junction of Mendenhall Road and Mines Road, 26/Jul/81, L&L, 250: FL 33-130 mm¹³⁴;

Arroyo Mocho Creek, approximately 0.4 km upstream from BM 2657 (T5S, R4E, Sec 27), 26/Jul/81, L&L, 500: FL 35-126 mm¹³⁶; Arroyo Mocho Creek, approximately 0.7 km downstream from BM 2470 (T5S, R4E, Sec 16), 26/Jul/81, L&L, 75: FL 22-56 mm¹³⁵; Arroyo Mocho Creek, at junction with Wente Road, 27/Jul/81, L&F, 5: FL 32-69 mm¹²²; South San Ramon Creek, at junction with Alcosta Blvd., 30/Jul/81, L&F, 4: FL 40-55 mm¹¹⁸; Tassajara Creek, at Tassajara Regional Park footbridge, 30/Jul/81, L&F, 200: FL 29-98 mm¹²⁰; South San Ramon Creek, pool immediately above Interstate 580 crossing, 31/Jul/81, L&L, 25: FL 97-130 mm¹¹⁹; Arroyo Valle Creek, at junction with Hwy 84, 1/Aug/81, L&L, 18: FL 38-147 mm¹³⁷; Arroyo Mocho Creek, 100 m upstream from junction with Hwy 81, 1/Aug/81, L&L, 99: FL 35-130 mm¹²¹; Arroyo Mocho Creek, at junction with Wente Road, 1/Aug/81, L&L, 53: FL 38-111 mm¹²³; Alameda Creek, opposite Sunol Regional Wilderness headquarters, 6/Aug/81, L&F, 500: FL 25-98 mm¹⁴³; Arroyo Mocho Creek, at junction of Tesla Road near Mines Road, 13/Aug/81, L&F, 150: FL 23-110 mm¹²⁵; Alameda Creek, at first railroad crossing upstream from Niles (T4S, R1W, Sec 15), 1/Oct/81, L&F, 8: FL 28-124 mm¹⁵¹; Alameda Creek, opposite Kaiser aggregate quarry, (T4S, R1W, Sec 12), 1/Oct/81, L&F, 6: FL 37-65 mm¹⁴⁹; Alameda Creek, immediately below spillway at gaging station near Sunol (T4S, R1E, Sec 7), 1/Oct/81, L&F, 25: FL 40-110 mm¹⁴⁷.

CONTRA COSTA COUNTY: Walnut Creek, 1 mile N of Walnut Creek, 26/Apr/39, R.R. Miller and J. Davis (UMMZ 133183, 111)⁸⁰; San Pablo Creek, at Orinda, 19/Nov/42, G. Murphy (SU 40800, 47)¹⁰³; Walnut Creek, at Alamo, 19/Dec/42, G. Murphy (SU 40801, 29)⁸⁵; San Pablo Creek, at Orinda, 19/Dec/42, G. Murphy (CAS, Acc. 1964-XI: 13, 1: SL 50.5 mm)¹⁰⁴; Walnut Creek at Alamo, 19/Dec/42, G. Murphy (CAS, Acc. 1964-XI: 13, 2: SL 47.5-53 mm)⁸³; San Ramon Creek, 1.8 miles above Walnut Creek (town), 3/Aug/45, W.I. Follett (CAS 19980, 137)⁸²; Las Trampas Creek, approximately ¼ mile E of Lafayette, Apr/46, M.H. Gluck (CAS 19102, 4: SL 95-118 mm)⁷⁷; Pinole Creek, from upper reach of tidal zone upstream 1.3 miles, 23/Apr/75, CDFG, 28⁸⁹; *Pinole Creek, lower reaches, 5,6/May/76, CDFG, numerous; *Pinole Creek, along a 200 yd reach downstream from the natural falls, (0.4 mile downstream from intersection of Pinole Valley Road, Alhambra Road and Hampton Road), 4/Jun/76, CDFG, 13: FL 2.1-4.5 in.⁹⁸;

San Pablo Creek, immediately upstream from Orinda Filtration Plant, 4/Jun/76, CDFG, 1: FL 2.7 in.¹⁰⁵; *Tice Creek, Tice Valley Blvd. to Lilac Drive, 12/Jul/76, CDFG, abundant; *Walnut Creek, from culvert having confluence with San Ramon Creek to mouth, 20,21/Jul/77, CDFG, abundant; *San Ramon Creek, near Danville, 26/Jul/77, CDFG; *Pine Creek, stream mile 7 to mouth, 28/Jul/77, CDFG, common; Pinole Creek, 0.4 mile downstream from intersection of Pinole Valley Road, Alhambra Valley Road, and Hampton Road (below bedrock falls), 9/Nov/78, CDFG, common: 1.5-2.5 in.⁹⁹; Pinole Creek, immediately downstream from intersection of Pinole Valley Road and Castro Road, 9/Nov/78, CDFG¹⁰⁰; Pinole Creek, immediately downstream from Simas Avenue, 9/Nov/78, CDFG⁹⁵; Pinole Creek, below Castro Ranch Road junction, 6/Nov/79, CDFG, 12: FL 1.3-2.8 in.¹⁰¹; Pinole Creek, upstream from Pinole Valley Road, N of the Ellorhorst intersection, 20/Nov/79, CDFG, 30: FL 1.9-3.3 in.⁹⁶; Walnut Creek, 50 m upstream from SPRR bridge at Walnut Creek Civic Center, 5/Oct/80, L&L, 46: TL 38-107 mm⁷⁵; San Ramon Creek, immediately below Creekside Drive bridge at USGS gaging station, 5/Oct/80, L&L, 25: TL 51-89 mm⁷⁹; Walnut Creek, 50 m upstream from junction with Pine Creek, 5/Oct/80, L&L, 2: TL 64 mm⁷⁴; San Ramon Creek, below falls approximately 150 m downstream from junction with Caheny Road crossing, 5/Oct/80, L&L, 1: TL 152 mm⁸¹; San Ramon Creek, at junction of Sycamore Valley Road, 6/Oct/80, L&L, 31: TL 44-121 mm⁸⁶; Green Valley Creek, immediately downstream from junction with Blemer Road, 6/Oct/80, L&L, 12: TL 51-127 mm⁸⁴; Green Valley Creek, immediately downstream from junction with Diablo Road, 6/Oct/80, L&L, 50: TL 51-104 mm⁸⁵; Tice Creek, at junction with Coventry Court, 6/Oct/80, L&L, 25: TL 51-102 mm⁷⁸; Las Trampas Creek, 50 m upstream from junction of Pleasant Hill Road, 12/Oct/80, L&F, 100: TL 53-79 mm⁷⁶; Marsh Creek, 0.15 km E of BM 485 on Marsh Creek Road (Tln, R1E, Sec 35), 22/May/81, L&L, 137: FL 32-108 mm⁷¹; Rodeo Creek, 0.3 km downstream from Interstate 80, 18/Jun/81, L&F, 17: FL 27-47 mm⁸⁸; Pinole Creek, 100 m upstream from culvert under San Pablo Avenue, 23/Jun/81, L&F, 6: FL 52-72 mm⁹¹; Pinole Creek, 200 m downstream from junction of Interstate 80, 23/Jun/81, L&F, 25: FL 40-75 mm⁹²; Pinole Creek, 150 m upstream from junction of Interstate 80, 23/Jun/81, L&F, 25: FL 32-65 mm⁹³;

Pinole Creek, at junction with Pinole Valley Road, opposite Pinole Valley High School, 23/Jun/81, L&F, 3: FL 35-52 mm⁹⁴; Pinole Creek, at junction with Pinole Valley Road, near Ellorhorst School, approximately 0.6 km downstream from ATSF railroad crossing, 25/Jun/81, L&F, 7: FL 27-47 mm⁹⁰; Pinole Creek, 0.25 mile downstream from junction with Pinole Valley and Castro Ranch Roads, 4/Aug/81, L&F, 100: FL 22-57 mm¹⁰²; Arroyo Hambre Creek, at Susana Street crossing, Martinez, 24/Aug/81, L&F, 10: FL 40-62 mm⁸⁷; Mt. Diablo Creek, at Kirker Pass Road crossing, 21/Sept/81, L&F, 7: FL 71-138 mm⁷³; Mt. Diablo Creek, at Port Chicago Hwy crossing, 21/Sept/81, L&F, 10: FL 40-62 mm⁸⁷.

MARIN COUNTY: San Anselmo Creek, San Anselmo (Fry, 1936: 68)¹¹; Miller Creek, at bridge 2704 on Hwy 101, 19/Jul/45, D. Simpson (CAS 12990, 50)¹⁴; Arroyo de San Jose at bridge 27-03 on Hwy 101, 100 yds S of Ignacio railroad station, 19/Jul/45, D. Simpson (CAS 12993, 3)¹⁸; Novato Creek, U.S. Hwy 101 bridge, 19/Jul/45, D. Simpson (CAS 12999, 1)²⁰; *San Anselmo Creek, downstream section, 26/Jul/59, CDFG, several thousand dead; Corte Madera Creek, at Lagunitas Road bridge, just W of Ross City Hall, 1/Nov/63, SFSU, 200¹; Corte Madera Creek, between Ross and San Anselmo, 15/May/65, SFSU, 241²; Corte Madera Creek, bridge at Ross, 9/Oct/67, SFSU, 182: 140-192 mm³; *San Antonio Creek, from San Antonio Slough to Chileno Valley Road, 9/Jul/68, CDFG; Corte Madera Creek, at Ross, 7/Oct/68, SFSU, 196: 14-79 mm⁴; Corte Madera Creek, bridge at Ross firehouse, 17/Oct/69, SFSU, 263: SL 17-81 mm⁵; Corte Madera Creek, Lagunitas Road bridge in Ross, 27/Sept/71, SFSU, 37: 17-65 mm⁶; Corte Madera Creek at bridge near fire station, Ross, 20/Sept/72, SFSU, ca. 50⁷; Corte Madera Creek, bridge near Ross firehouse off Sir Francis Drake Blvd., 24/Sept/73, SFSU, 561⁸; Corte Madera Creek at Ross, vicinity of bridge over creek adjacent to Ross fire station, 16/Oct/74, SFSU, 191: 18-55 mm⁹; Miller Creek, at Mt. Shasta Drive crossing, 17/Sept/81, L&F, 1: FL 47 mm¹⁷; Miller Creek, 50 m upstream from Sequeira Road crossing, 17/Sept/81, L&F, 35: FL 27-120 mm¹⁶; Miller Creek, at Gallinas Road crossing, 17/Sept/81, L&F, 25: FL 20-100 mm¹⁵; Arroyo de San Jose, at Enfrente Blvd., 17/Sept/81, L&F, 30: FL 45-136 mm¹⁹; Warner Creek, at McClay Road crossing, 17/Sept/81, L&F, 10: FL 33-72 mm²¹; Cascade Creek, at Bolinas Road crossing, 18/Sept/81, L&F,

12: FL 21-98 mm¹³; Corte Madera Creek, downstream from Madrone Drive crossing, 18/Sept/81, L&F, 200: FL 21-146 mm¹²; Corte Madera Creek, at Lagunitas Road, 18/Sept/81, L&F, 50: FL 22-106 mm¹⁰ NAPA COUNTY: Conn Creek, tributary to Napa River, 26/May/97, C.H. Gilbert (SU); Napa Creek, Calistoga, 30/May/97, C.H. Gilbert (SU 24642, 17)²⁸; Napa River, Calistoga, as Rutilus symmetricus (Snyder, 1908: 160)²⁹; Napa River, Rutherford, as Rutilus symmetricus (Snyder, 1908: 160)⁴⁰; Conn Creek, as Rutilus symmetricus (Snyder, 1908: 160); Conn Creek, $\frac{1}{4}$ mile above dam under construction, 30/Jul/45, CDFG, 58: juveniles⁵⁶; Moore Creek, at Greenfield Ranch, 1.5 miles above junction with Chiles Creek, 30/Jul/45, CDFG, 4: juveniles; Conn Creek, from BB Ranch downstream 3 miles, 31/Jul/45, CDFG, 20: juveniles and young adults; Moore Creek, tributary to Napa River, 10/Aug/45, B. Curtis (CAS 20942, 13: SL 54-82 mm); Chiles Creek, in canyon above mouth of Moore Creek, 27/Aug/45, B. Curtis (CAS 20937, 21: SL 14-47 mm)⁵⁹; *Conn Creek, at mouth, 15/Jun/48, G. Murphy (CDFG, numerous); Chiles Creek, at gaging station just below the mouth of Moore Creek, 15/Jun/48, G. Murphy (CDFG, numerous); Sage Creek $\frac{1}{8}$ mile above mouth, 15/Jun/48, G. Murphy (CDFG, large schools); Sage Creek, 15/Jul/50, H.E. Pintler (CAS 23086, 9: SL 34-66 mm); Tulacay Creek, near mouth, Napa (CAS 23832, 1); Creek near Yountville, in old soldiers home, tributary to Napa River, 31/Aug/55, E.W. Kirschbaum, T. Doud and D. Rentz (CAS, Acc. 1958-VIII: 9, 16); *Sulphur Creek, west tributary, 28/Oct/58, CDFG, a few; *Huichica Creek, headwater tributary below Lovall and Carneros Valleys to a point 2.7 miles downstream, 8/Jul/60, CDFG; *York Creek (T8N, R6W, Sec 25), 19/May/66, CDFG; *Carneros Creek, 26/May/66, CDFG; *Huichica Creek, lower 5.25 miles, 27/May/66, CDFG; *Redwood Creek, below junction of Dry Creek, 8,9,10/Jun/66, CDFG, abundant; *Hinman Creek, tributary to Dry Creek, 600 yds below garbage dump, 23,25/Jun/66, CDFG; *Brown's Valley Creek, 29/Jun/66, CDFG; Outfall from storm drain 100 yds E of Hwy 29 bridge to confluence with Napa River, 15/Jun/67, CDFG, (fish kill), 1800:0.8-4 in.; *Ritchie Creek, pools upstream from confluence with Napa River, 13/Jul/67, CDFG, numerous; *Bell Canyon Creek, Bell Canyon Dam to mouth, 20/Jun/69, CDFG; Bell Canyon Creek, approximately 1 mile downstream from Bell Canyon Dam within NE $\frac{1}{4}$ of SW $\frac{1}{4}$ of Sec 13, T8N,

R6W, 18/Jul/69, CDFG, 129: FL 1.5-3.5 in.³¹; Napa River, Yountville Cross Road, 28/Jul/69, CDFG⁴¹; Napa River, Hwy 128 bridge, 29/Jul/69, CDFG³⁹; Napa River, Zinfandel Lane, 29/Jul/69, CDFG³⁸; Napa River, Pope Street bridge, 31/Jul/69, CDFG³⁵; Napa River, Pratt Avenue bridge, 4/Aug/69, CDFG³³; Napa River, Bale Lane bridge, 5/Aug/69, CDFG³²; Napa River, Berry Avenue bridge, 8/Aug/69, CDFG; Napa River, downstream from Kimball Dam, 8/Aug/69, CDFG⁹; *Garnett Creek, downstream from Hwy 29 bridge, 16/Jun/70, CDFG; *Garnett Creek, 1/Jul/70, CDFG; Suisun Creek, off Gordon Valley Road, immediately below Lake Curry, 10/Aug/72, P.B. Moyle (UCDPM 72-12, 15); Wooden Valley Creek at Wooden Valley Road bridge (T6N, R3W, Sec 23), P.B. Moyle (UCDPM 72-11, 20); Napa River, Yount Mill Road, 20/Oct/72, P.B. Moyle (UCDPM 72-24, 3)⁶⁵; *Suscol Creek, middle section, 8,9/May/73, CDFG; *Suscol Creek, Hwy 29 bridge, 1500' upstream, 26/Jun/73, CDFG, abundant; *York Creek, near dams along Spring Mountain Road, 9/Jul/73, CDFG; *Dry Creek, lower section from mouth to point 8 miles upstream (T6N, R5W, Sec 4), 3,7/Aug/73, CDFG; *Ritchie Creek, from confluence with Napa River upstream to Hwy 29, 5/Oct/73, CDFG, *Bell Canyon Creek, Bell Canyon Dam to mouth, 17/Jul/75, CDFG; Milliken Creek, below 3rd barrier between Silverado Country Club dam and Milliken Reservoir, 3/Nov/76, CDFG; *Milliken Creek, lower section below canyon, CDFG; *Milliken Creek, mouth of Milliken Canyon, CDFG, 10⁴⁴; *Redwood Creek, mouth to 1.75 miles upstream, 13,14/Apr/77, CDFG, numerous; Sulphur Creek, Pope Street, first crossing above Silverado Trail, 23/May/80, CDFG, 39; Sulphur Creek, above junction with Pope Street, 23/May/80, CDFG, 15; Sulphur Creek, below junction with Pope Street, by BM 309, 23/May/80, CDFG, 32; *Huichica Creek, 0.9 mile downstream from the concrete dam, 8/Jul/80, CDFG; Garnett Creek, at Grant Street crossing, 9/Sept/81, L&F, 26: FL 20-47 mm²⁷; Napa River, at Dunaweal Lane, 9/Sept/81, L&F, 200: FL 57-121 mm³⁰; York Creek, at junction of Spring Mountain Road, 9/Sept/81, L&F, 10: FL 24-106 mm³⁴; Sulphur Canyon Creek, 1.7 miles upstream on White Sulphur Springs Road from junction with Main Street, St. Helena, 9/Sept/81, L&F, 20: FL 41-112³⁷; Sulphur Creek, at junction with Pope Street, 9/Sept/81, L&F, 11: FL 27-43 mm³⁶; Conn Creek, 1.5 miles above Lake Hennessey, 9/Sept/81, L&F, 100: FL 31-88 mm⁵⁵; Conn Creek,

50 m upstream from road crossing immediately above Hennessey Lake, 9/Sept/81, L&F, 2: FL 57-72 mm⁵⁴; Napa River, at Yountville Cross Road, 10/Sept/81, L&F, 53: FL 52-112 mm¹⁸; Dry Creek, 7.75 miles upstream on Dry Creek Road from junction with Redwood Road, 10/Sept/81, L&F, 13: FL 37-73 mm⁴²; Redwood Creek, along Redwood Road, 0.25 mile before junction with Brown's Valley Road, 10/Sept/81, L&F, 32: FL 37-82 mm⁴⁹; Conn Creek, at milepost 8.07 E on Hwy 128, 10/Sept/81, L&F, 34: FL 27-88 mm⁵⁵; Chiles Creek, 0.25 mile upstream from junction with Moore Creek, 10/Sept/81, L&F, 58: FL 24-98 mm⁵⁸; Chiles Creek, immediately downstream from junction of Lower Chiles Valley Road and Chiles-Pope Valley Road, 10/Sept/81, L&F, 20: FL 34-62 mm⁶⁰; Sage Creek, at milepost 15.5 on Hwy 128, 10/Sept/81, L&F, 7: FL 32-78 mm⁵⁷; Napa Creek, at junction with Jefferson Street, Napa, 12/Sept/81, L&F, 61: FL 20-85 mm⁴⁸; Tulacay Creek, at junction with 4th Avenue, 12/Sept/81, L&F, 13: FL 32-68 mm⁵¹; Tulacay Creek, at Suscol Avenue crossing, 12/Sept/81, L&F, 2000: FL 35-90 mm⁵⁰; Murphy Creek, at junction with Shadybrook Lane (T5N, R3W, Sec 8), 12/Sept/81, L&F, 5: FL 33-63 mm⁵²; Suscol Creek, at junction of frontage road along Hwy. 12 (29), 12/Sept/81, L&F, 250: FL 20-43 mm⁶²; Milliken Creek, at West Trancas Road crossing, 12/Sept/81, L&F, 17: FL 43-115 mm⁴⁶; Milliken Creek, at junction with West Gate Drive (T6N, R4W, Sec 24), 12/Sept/81, L&F, 35: FL 35-73 mm⁴⁵; Sarco Creek, upstream from junction with Hwy 121, 12/Sept/81, L&F, 17: FL 28-105 mm⁴⁷; Soda Creek, at Milepost 2.25 on Soda Canyon Road, 12/Sept/81, L&F, 7: FL 35-80 mm⁴³; Huichica Creek, downstream from junction with Hwy 121 (12), 14/Sept/81, L&F, 12: FL 35-92 mm⁶¹; American Canyon Creek, at American Canyon Road crossing (T4N, R4W, Sec 25), 19/Sept/81, L&F, 20: FL 21-126 mm⁶⁴; American Canyon Creek, at end of Elliot Road, 19/Sept/81, L&F, 10: FL 58-152 mm⁶³. SAN MATEO COUNTY: San Mateo Creek, 1857 and 1860, T.D. Cory and A. Agassiz (UMMZ 87106, 10: 74-91 mm)²⁷⁶; San Francisquito Creek, as Rutilus symmetricus (Snyder, 1905: 332); Madera Creek, as Rutilus symmetricus (Snyder, 1905: 332); San Francisco Creek, below Searsville Lake, isolated pool of water only present, 30/Aug/36, L. Shapovalov and W.A. Dill (CAS, Acc. 1952-X: 30, 4)²⁷³; San Francisquito Creek, 19/May/38, L. Shapovalov (CAS, Acc. 1952-X: 30, 4); San Francisquito Creek, near [Stanford] campus, Dec/38, A. Calhoun and Gosline

(SU 36980, 54)²⁶⁹; San Francisquito Creek, Stanford University, Palo Alto, 3/Jun/39, C.D. Grant and K. Stanton (SU, 49)²⁷⁰; San Francisquito Creek, bridge W of golf course, Stanford University, 11/Jun/39, C.D. Grant and K. Stanton (SU 59821, 10)²⁷¹; San Francisquito Creek, diversion channel leading to Lagunita Lake, Stanford University, 20/May/66, CDFG²⁶⁵; *West Union and Bear Gulch junction to confluence with San Francisquito Creek, 24/May/76, CDFG, numerous; *San Francisquito Creek, upstream from Junipero Serra Blvd., 1,2,5/Jul/76, CDFG; San Francisquito Creek, Junipero Serra Blvd. crossing, 13/Jul/76, CDFG, 8: FL 1.2-2.5 in.²⁶⁴; San Francisquito Creek, Lake Laguna diversion dam, 13/Jul/76, CDFG, 10: FL 1.9-3.0 in.²⁶⁶; San Francisquito Creek, 75 yds downstream from Fwy 280, 13/Jul/76, CDFG, 10: FL 1.9-3.1 in.²⁶³; San Francisquito Creek, 1.5 miles above Junipero Serra Fwy 280 crossing, 13/Jul/76, CDFG, abundant: 2.0-2.5 in.; Bear Creek, upstream from Sand Hill Road, 15/Jul/76, CDFG, 10: FL 1.9-3.8 in.²⁷⁵; San Francisquito Creek, at junction with Middlefield Road, 15/Aug/81, L&F, 50: FL 26-85 mm²⁷²; San Francisquito Creek, 0.4 km downstream from junction with Willow Road, 16/Aug/81, L&F, 250: FL 21-56 mm²⁶⁷; San Francisquito Creek, 20 m downstream from junction with Willow Creek, at junction with 1st Street of Alpine Road, 16/Aug/81, L&F, 200: FL 27-74 mm²⁷⁴. SANTA CLARA COUNTY: Coyote Creek, 30/Jun/98, J.O. Snyder (SU 37845, 3); Santa Isabel Creek, Mt. Hamilton, 30/Jul/98, J.O. Snyder (SU 37846, 153)¹⁶³; Guadalupe, Coyote, Arroyo Hondo, Isabel, and San Antonio Creek, as Rutilis symmetricus (Snyder, 1905: 332); Coyote Creek, Gilroy, as Hesperoleucas venustus (Snyder, 1913: 64); Guadalupe Creek, San Jose (in city), 30/Sept/22, C.L. Hubbs (UMMZ 63408, 115: 27-95 mm)²⁴⁷; Coyote Creek, San Jose (in city), 1/Oct/22, C.L. Hubbs (UMMZ 63412, 105: 30-75 mm)²⁰³; Coyote Creek, between Milpitas and Alviso, 24/Oct/22, C.L. Hubbs (UMMZ 63415, 106: 22-56 mm)²⁰⁸; Coyote Creek, 5 miles from Gilroy, Apr/25 (CAS 23773, 28); Coyote Creek, about 5 miles S of Gilroy Hot Springs, 25/Apr/25 (SU 31853, 40); Coyote Creek, 3/Jul/27, A.C. Taft (SU 20803, 106); Upper Coyote Creek (Fry, 1936: 67); Calero Creek, tributary of Guadalupe Creek, 18/Sept/37, A. Taft and L. Shapovalov (SU 37847, 49)²²⁸; Coyote Creek, above Coyote Reservoir, 30/May/38, W.A. Dill (CAS, Acc. 1952-X: 30, 1)¹⁸⁵; Canada de los

Osos, tributary to Coyote Creek (T10S, R5E, Sec 29), 9/Nov/38, L. Shapovalov (CAS 20890, 15)¹⁸⁴; Canada de los Osos, tributary to Coyote Creek (T10S, R5E, Sec 19), 9/Nov/38, L. Shapovalov (CAS 20889, 30)¹⁸³; Upper Isabel Creek, 28/Jan/39, Calhoun and Cope (SU, 69); Upper Isabel Creek, 28/Jan/39, Calhoun, Cope, and Minnich (SU 15978, 50+)¹⁶¹; San Antonio Creek, near headwaters, ca. 10 miles from Mt. Hamilton, on road to Livermore, 20/May/39, Helm and Calhoun (SU 15979, 26)¹⁵⁷; Coyote Creek, below bridge at Calif. Hwy 17 (lat. 37°, 25', 20"N, long. 121°, 55', 30"W), 31/Oct/41, W.I. Follett (CAS 40252, 1)²⁰⁴; Coyote Creek (lat. 37°, 22', 33"N, long. 121°, 53', 45"W), 31/Oct/41, W.I. Follett (CAS 40253, 1)²⁰⁷; Coyote Creek, opposite Milpitas (lat. 37°, 25', 20"N, long. 121°, 55', 30"W), 31/Oct/41, W.I. Follett (CAS 18604, 23)²⁰⁵; Coyote Creek, at Calif. Hwy 9 (opposite Milpitas), 2/Aug/44, W.I. Follett (CAS 180602, 6)²⁰⁶; Coyote Creek, 300 yds below Coyote dam at Coyote Lake, 23/Aug/45, D.A. and H. Simpson (CAS 13266, 239: SL 18-83 mm)¹⁸⁸; Coyote River, about 6 miles S of San Jose, near stone quarry, 24/Aug/45, D.A. and H. Simpson (CAS 13271, 39: SL 20-52 mm)¹⁹⁶; Coyote River, on Hwy 101, 1.5 miles N of Coyote at concrete dam, 24/Aug/45, D.A. and H. Simpson (CAS 13280, 58: all ages)¹⁹²; Coyote River, on Hwy 101 at old service station at N. Coyote, 24/Aug/45, D.A. and H. Simpson (CAS, 13282, 29: small young and subadults)¹⁹³; Coyote Creek, at N Coyote just S of junction of unnamed creek on E side of Hwy 101, 25/Aug/45, D.A. and H. Simpson (CAS 13285, 127: SL 25-75 mm)¹⁹⁴; Coyote River, 25/Aug/45, D.A. Simpson (CAS 18726, 8: 46-73); Penitencia Creek, below Cherry Flat Reservoir, drainage E of San Jose, A. Calhoun (CAS, Acc. 1951-III: 20, 3)²¹⁷; Coyote Creek drainage, 23/Apr/53, (SJSU, CD-20); Coyote Creek, at Gilroy Hot Springs X-ing (T10S, R5E, Sec 6), 23/Jul/53, T.J. Merkel (CAS 20967, 5)¹⁷⁰; Coyote Creek, 0.4 mile by road downstream from Gilroy Hot Springs Road and Canada Road (T10S, R4E, Sec 12), 23/Jul/53, T.J. Merkel (CAS 20969, 9)¹⁷²; Coyote Creek, 1.4 miles by road downstream from junction of Gilroy Hot Springs Road and Canada Road (T10S, R4E, Sec 11), 23/Jul/53, T.J. Merkel (CAS 20973, 3)¹⁷⁴; Coyote Creek, 1.2 miles by road upstream from junction of Gilroy Hot Springs Road and Canada Road (T10S, R5E, Sec 7), 23/Jul/53, T.J. Merkel (CAS 20973, 5)¹⁷⁹; Coyote

Creek, 1.5 miles by road upstream from junction of Gilroy Hot Springs Road and Canada Road (T10S, R5E, Sec 6), 23/Jul/53, T.J. Merkel (CAS 20974, 5)¹⁸⁰; Coyote Creek, 1.8 miles by road upstream from junction of Gilroy Hot Springs Road and Canada Road (T10S, R5E, Sec 6), 23/Jul/53, T.J. Merkel (CAS 20975, 8)¹⁸¹; Coyote Creek, at U.S. Hwy 101 X-ing (T7S, R2E, Sec 31), 24/Jul/53, T.J. Merkel (CAS 20980, 1)¹⁹⁷; Guadalupe Creek, at Coleman Road X-ing (T8S, R1E, Sec 19), 24/Jul/53, T.J. Merkel (CAS 20982, 1)²³⁸; Guadalupe Creek, from 0.2 to 0.5 mile by road upstream from junction of Hicks Road-Shannon Road (T8S, R1E, Sec 30), 24/Jul/53, T.J. Merkel (CAS 20984, 5)²⁴⁰; Guadalupe Creek, 1.4 to 1.5 miles by road upstream from junction of Hicks Road-Shannon Road (T8S, R1E, Sec 30), 24/Jul/53, T.J. Merkel (CAS 20985, 2)²⁴¹; Penitencia Creek, just outside of western boundary of Alum Rock Park (T5S, R1E, Sec 24), 24/Jul/53, T.J. Merkel (CAS 20987, 10)¹¹⁵; Calero Reservoir, outlet at McKean Road crossing (T8S, R2E, Sec 31), 24/Jul/53, T.J. Merkel (CAS 20977, 9)²²⁹; Penitencia Creek, junction of Noble Avenue, 24/Jul/53, CDFG; Coyote Creek drainage, 29/Oct/54, (SJSU, CD-6); Coyote Creek drainage, 3/Jun/55, (SJSU, CD-8); Coyote Creek drainage, 6/Jun/55, (SJSU, CD-9); Silver Creek, 80 S Montgomery Street, San Jose, 5/Apr/56, (CAS 21206, 3)²²⁷; San Francisquito Creek drainage, Mar/56, (SJSU, SF-7); Coyote Creek drainage, 29/Apr/56, (SJSU, CD-15); Coyote Creek, above bridge 0.8 mile below Gilroy Hot Springs on Gilroy Hot Springs Road, 12/May/64, W.I. Follett (CAS, 13)¹⁷⁸; Coyote Creek, 4.8 miles below Gilroy Hot Springs on Gilroy Hot Springs Road (Plaseau Ranch), 12/May/64, W.I. Follett (CAS, 12)¹⁸⁶; Coyote Creek, from confluence with Coyote Reservoir upstream 8.2 miles to center of Sec 24, T9S, R4E, 18/Mar/65, CDFG; Coyote Creek, between Coyote Reservoir and Gilroy Hot Springs, 5/Sept/65, R.N. Lea and M. Lea (CAS, Acc. 1967-I: 9, 127)¹⁷⁷; Coyote Creek, 7/Mar/72, R.L. Hassur (SJSU); Coyote Creek, 1.3 miles below Gilroy Hot Springs, Gilroy Hot Springs Road, 27/Oct/72, W.I. Follett (CAS, 4)¹⁸⁷; Coyote Creek, middle fork (Guzzetta, 1974: 28)^{165,166}; Coyote Creek, middle fork (Guzzetta, 1974: 28)¹⁶⁷; Kelly Cabin Creek (Guzzetta, 1974: 28)¹⁶⁸; *Upper Penitencia Creek, 0.75-1.0 mile downstream from Cherry Flat Reservoir spillway, 3/Jul/75, CDFG, 150; *Upper Penitencia Creek, junction with Arroyo

Aguague Creek, 3/Jul/75, CDFG, numerous; *Upper Silver Creek, below fork of two headwater tributaries to Silver Creek Road, 19/Aug/75, CDFG; Arroyo Aguague Creek, downstream from natural falls, 16,17/Sept/75, CDFG, common: 1.5-3 in.²¹⁸; Coyote Creek, 100 yds below Berryessa Road, 23/Sept/75, CDFG, 62: FL 1-5 in.²⁰⁰; Coyote Creek, upstream from Oakland Road bridge, 23/Sept/75, CDFG, 60: FL 1-3 in.²⁰²; Guadalupe River, Brokaw Road crossing, 29/Sept/75, CDFG, several hundred dead²⁴³; Guadalupe River, West Taylor Street crossing, 26/Sept/75, CDFG, 10: FL 1.5-2.5 in.²⁴⁵; Guadalupe River, Auzerius Street crossing, 26/Sept/75, CDFG, 30-40: FL 1-3 in.²⁴⁸; Guadalupe River, Alma Street crossing, 26/Sept/75, CDFG, numerous: FL 1-3 in.²⁴⁹; Guadalupe River, at Willow Glen Way, 26/Sept/75, CDFG, numerous: FL 1-3 in.²⁵¹; Guadalupe River, downstream from Guadalupe Dam on Hicks Road (T8S, R2E, Secs 19 and 30), 14/Dec/75, CDFG, numerous²³⁶; Los Trancos Creek, upstream from Piers Lane crossing, 14/Jul/76, CDFG, 10: FL 1.2-2.5 in.; Los Trancos Creek, downstream from Felt Lake diversion, 7/Aug/76, CDFG, abundant²⁶⁰; *Coyote Creek, downstream from confluence of Upper Penitencia Creek, 19/May/77, CDFG, numerous; Stevens Creek, Stevens Creek Road bridge nearest Stevens Creek Canyon Road, 8/May/78, CDFG, 1: FL 2.5 in.²⁵⁵; Los Trancos Creek, under Hwy 280, 11,12/Jun/78, CDFG, 3: FL 2.5-2.8 in.²⁶¹; Coyote Creek, Gilroy Hot Springs (Scoppettone and Smith, 1978: 63)¹⁷¹; Coyote Creek, middle fork, Coe State Park (Scoppettone and Smith, 1978: 63)¹⁶⁹; Coyote Creek, 2 km downstream from Gilroy Hot Springs (Scoppettone and Smith, 1978: 63)¹⁷³; Coyote Creek, below Anderson Reservoir (Scoppettone and Smith, 1978: 63)¹⁸⁹; Coyote Creek, above percolation ponds, 2 km below Anderson Reservoir (Scoppettone and Smith, 1978: 63)¹⁹⁰; Coyote Creek, Riverside Golf Course Road (Scoppettone and Smith, 1978: 63)¹⁹¹; Coyote Creek, mouth of Penitencia Creek, (Scoppettone and Smith, 1978: 63)²⁰¹; Silver Creek, Upper Silver Creek Road (Scoppettone and Smith, 1978: 63)²²⁰; Penitencia Creek, Alum Rock Park (Scoppettone and Smith, 1978: 63)²¹⁶; Penitencia Creek, 1 to 3 km downstream from Alum Rock Park (Scoppettone and Smith, 1978: 63)²⁰⁹; Isabel Creek, Kincaid Road (Scoppettone and Smith, 1978: 63)²²⁴; Arroyo Hondo Creek, Arroyo Hondo Road (Scoppettone and Smith, 1978: 63)²²⁵; Smith Creek, Mt. Hamilton Road (Scoppettone and Smith, 1978: 63)²²³; Upper

Penitencia Creek, 0.6 km upstream from junction of Dutard Creek on Penitencia Creek Road, 11/Aug/81, L&F, 7: FL 32-60 mm²¹⁰; Upper Penitencia Creek, at junction with Dutard Creek, 11/Aug/81, L&F, 5: FL 30-42 mm²¹¹; Upper Penitencia Creek, at water treatment plant outfall, opposite Linda Vista Road, 11/Aug/81, L&F, 21: FL 31-90 mm²¹²; Upper Penitencia Creek, 0.6 km upstream from junction with Capitol Avenue, 11/Aug/81, L&F, 200: FL 39-62 mm²¹³; Upper Penitencia Creek, at upstream junction with Mabury Road, 11/Aug/81, L&F, 26: FL 20-67 mm²¹⁴; Arroyo de los Coches, at junction with Fwy 680 frontage road near Calaveras exit, 12/Aug/81, L&F, 10: FL 18-30 mm²²⁶; Smith Creek, at junction with Mt. Hamilton Road, 13/Aug/81, L&F, 52: FL 27-80 mm¹⁶²; Isabel Creek, at junction with Kincaid Road, 13/Aug/81, L&F, 100: FL 18-60 mm¹⁵⁹; Arroyo Bayo Creek, 1.2 km E of BM 1924 on San Antonio Road, 13/Aug/81, L&F, 95: FL 40-89 mm¹⁵⁸; Beauregard Creek, 0.2 km downstream from junction with Sulphur Springs Creek, 13/Aug/81, L&F, 2: FL 40-89 mm¹⁵⁶; Los Trancos Creek, 0.25 mile upstream from Fwy 280 crossing, 16/Aug/81, L&F, 77: FL 21-61 mm²⁶²; Stevens Creek, at Stevens Creek Road crossing, 19/Aug/81, L&F, 2: FL 58-71 mm²⁵⁶; Stevens Creek, 100 m upstream from gaging station at Stevens Creek County Park, 18/Aug/81, L&F, 56: FL 40-87 mm²⁵⁷; Stevens Creek, 20 m downstream from 1st bridge above Stevens Creek Reservoir on Eden Road, 20/Aug/81, L&F, 15: FL 37-76 mm²⁵⁸; Stevens Creek, at bridge 5.9 miles upstream from Stevens Creek Reservoir, 20/Aug/81, L&F, 6: FL 51-62 mm²⁵⁹; San Tomas Aquinas Creek, at junction of Old Adobe Road, 25/Aug/81, L&F, 250: FL 22-101 mm²⁵³; Vasona Creek, at Alendale Avenue, 25/Aug/81, L&F, 260: FL 21-107 mm²⁵⁴; Guadalupe River, at West Virginia Avenue crossing, 26/Aug/81, L&F, 95: FL 17-102 mm²⁵⁰; Guadalupe River, at junction with Canoas Creek, 26/Aug/81, L&F, 15: FL 20-37 mm²⁵²; Guadalupe River, 1.2 km downstream from junction of Redwood Avenue and Coleman Avenue, 26/Aug/81, L&F, 2000: FL 30-72 mm²⁴²; Guadalupe River, at Camden Avenue, 26/Aug/81, L&F, 100: FL 17-87 mm²³⁹; Guadalupe River, at USGS gaging station on Hicks Road, 26/Aug/81, L&F, 100: FL 17-82 mm²³⁷; Guadalupe River, 50 m downstream from Guadalupe Dam, 26/Aug/81, L&F, 50: FL 21-121 mm²³⁵; Rincon Creek, 50 m upstream from confluence with Guadalupe River, 26/Aug/81, L&F, 11: FL 18-68 mm²³⁴; Guadalupe River, 0.3

km S of Bayshore Fwy on Guadalupe Parkway, near San Jose Municipal Airport, 30/Aug/81, L&L, 2: FL 80-94 mm²⁴⁴; Guadalupe River, at Seymore Street crossing, 30/Aug/81, L&L, 10: FL 13-58 mm²⁴⁶; Coyote Creek, at Balfour Road, off Senter Road, 31/Aug/81, L&F, 150: FL 19-70 mm¹⁹⁸; Coyote Creek, at San Jose Bible School, near Hwy 280 crossing, 31/Aug/81, L&F, 24: FL 17-67 mm¹⁹⁹; Babb Creek, at junction with Silver Creek, 1/Sept/81, L&F, 10: FL 32-43 mm²¹⁹; Silver Creek, 1 km upstream from junction of Capitol Expressway and Silver Creek Road, 1/Sept/81, L&F, 4: FL 32-42 mm²²¹; Silver Creek, 0.25 mile upstream from beginning Evergreen Canal on Silver Creek Road, 1/Sept/81, L&F, 100: FL 24-91 mm²²²; Herbert Creek, at Alamitos Road and Hicks Road, 3/Sept/81, L&F, 5: FL 23-86 mm²³³; Alamitos Creek, at Alamitos Road crossing above Vichy Springs, 3/Sept/81, L&F, 20: FL 23-77 mm²³²; Alamitos Creek, at junction of Graystone Lane off Camden Avenue, 3/Sept/81, L&F, 300: FL 26-121 mm²³¹; Arroyo Calero Creek, at junction of Camden Avenue and Grimes wood Court, 3/Sept/81, L&F, 31: FL 27-73 mm²³⁰; Coyote Creek, 25 m upstream from Metcalf Road crossing, 3/Sept/81, L&F, 4: FL 22037 mm¹⁹⁵; Coyote Creek, 6.12 miles E on Gilroy Hot Springs Road from junction with Canada Road, 5/Sept/81, L&F, 200: FL 32-43 mm²¹⁹; Silver Creek, Gilroy Hot Springs Road from junction with Canada Road, 5/Sept/81, L&F, 56: FL 40-87 mm²⁵⁷; Canada de los Osos Creek, 1.25 miles upstream from junction of Canada Road and Gilroy Hot Springs Road, 5/Sept/81, L&F, 26: FL 40-72 mm¹⁸²; San Felipe Creek, at San Felipe Valley Road bridge, 5/Sept/81, L&F, 150: FL 32-110 mm¹⁶⁴. SOLANO COUNTY: Green Valley Creek, at Interstate 80 crossing, 2/Oct/81, L&L, 1: FL 110 mm⁷⁰; Green Valley Creek, at Mason Road crossing, 2/Oct/81, L&L, 250: FL 30-90 mm⁶⁹; Suisun Creek, at Suisun Valley Road crossing, immediately downstream from Twin Sisters Gun Club turnoff, 2/Oct/81, L&L, 3: FL 65-132 mm⁶⁸; Suisun Creek, at gate to Lake Curry on Lakeside Road, 2/Oct/81, L&L, 7: FL 50-128 mm⁶⁷; Wooden Valley Creek, 0.3 mile upstream from BM 535 on Wooden Valley Road, 2/Oct/81, L&L, 15: FL 21-35 mm⁶⁶. SONOMA COUNTY: *Nathanson Creek, pools within Sonoma, 12/Sept/74, CDFG; *Rodgers Creek, 2.25 miles downstream from headwaters to 1/8 mile above mouth, 29/Jul/75, CDFG, abundant: 1-5 in.; *Calabazas Creek, 12/Sept/75, CDFG; *Stemple Creek, lower section below falls barrier to mouth, 17/Oct/75, CDFG; *Sonoma Creek, pool approximately 0.25

mile below Madrone Road bridge, 7/Apr/77, CDFG, many: 2-3 in.; Sonoma Creek, on Adobe Canyon Road 0.25 mile downstream from entrance to Sugarloaf Ridge State Park (T6N, R6W, Sec 21), 14/Sept/81, L&F, 17: FL 40-85 mm²²; Sonoma Creek, 0.5 mile W on Warm Springs Road from junction with Hwy 12, 14/Sept/81, L&F, 150: FL 27-86 mm²³; Yulupa Creek, 0.25 mile upstream on Bennett Valley Road from junction with Warm Springs Road, 14/Sept/81, L&F, 27: FL 15-61 mm²⁴; Felder Creek, 0.2 mile downstream from W end of Felder Road, 14/Sept/81, L&F, 150: FL 25-110 mm²⁵; Sonoma Creek, at West Watmaugh Road crossing, 15/Sept/81, L&F, 250: FL 21-102 mm²⁶.

Lavinia symmetricus symmetricus x Lavinia exilcauda exilcauda

Distributional Records. ALAMEDA COUNTY: Arroyo de la Laguna Creek, 3 miles N of Sunol, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 3: SL 43-52 mm).

Catostomus occidentalis

Distributional Records. ALAMEDA COUNTY: [Alameda Creek], Sunol, [?15/Jun/98], [?J.O. Snyder] (CNHM 2592: 3 small adults; J.D. Hopkirk, personal communication); Alameda Creek (Snyder, 1905: 331); Alameda Creek, Niles Canyon, 24/Jul/27, W.I. Follett (CAS, Acc. 1927, several: halfgrown); Livermore?, 3/Jul/31 (SU 11666, 1); Alameda Creek (Seale, 1934: 152); Alameda Creek, 25/Feb/39, G. Murphy and R.R. Miller (SSU-280, 5); Crow Creek, Jun-July, 1954, G.M. Peckham (CAS, Acc. 1954-IX: 16, 2); Alameda Creek, ca. 100 yds below SPRR bridge, Niles, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS, Acc. 1955-X: 31, several halfgrown)¹³³; Alameda Creek, 29/Jul/56, G.M. Peckham (CAS, Acc. 1956-VIII: 7, 1: small adult); Alameda Creek, pools opposite Calif. Nursery Co., Niles, 25/Mar/57, W.I. Follett and G.M. Peckham (CAS 26256, 1)¹³⁴; Alameda Creek, pools at Niles Sand and Gravel Company, 22/Apr/57, W.I. Follett and

G.M. Peckham (CAS 26726, 1: adult)¹³⁵; Alameda Creek, 0.4 mile above old Calif. Hwy 17, 0.2 mile above bridge of new fwy, 21/Jul/57, W.I. Follett and G.M. Peckham (CAS 26747, 1: halfgrown)¹³²; Alameda Creek, near hwy bridge E of Niles, 18/Aug/61, J.D. Hopkirk, S. Mathews, R.J. Behnke (CAS 22878, 16: SL 33-94 mm)¹³⁶; Alameda Creek, near hwy bridge E of Niles, 18/Aug/61, J.D. Hopkirk, S. Mathews, R.J. Behnke (CAS 22883, 1: adult, SL 241 mm)¹³⁷; Alameda Creek, at Niles, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20,4: SL 61-80 mm)¹³⁸; Arroyo de la Laguna, 3 miles N of Sunol, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 3: SL 73-96 mm)¹⁰³; Kaiser borrow pits, will be called "Shadow Cliffs", 19/Mar/70, W.E. Strocchein (CAS 39826, 1)⁹⁶; Alameda Creek, picnic ground at railroad bridge, Niles Canyon, 20/Feb/72, W.I. Follett (CAS, 3 dead and parts of three others)¹²⁵; Alameda Creek, Niles Canyon, 0.3 mile downstream from picnic ground at railroad bridge, 20/Feb/72, W.I. Follett (CAS, 2 dead)¹²⁶; Alameda Creek, 0.4 mile downstream from picnic ground at railroad bridge, below "flattish dam," Niles Canyon, 20/Feb/72, W.I. Follett (CAS, 6 dead)¹²⁷; Alameda Creek, 0.6 mile upstream from bridge "1948" on Niles Canyon Road, W.I. Follett (CAS, 2 dead)¹²⁸; Alameda Creek, 3.4 miles upstream from bridge "1948" on Niles Canyon Road, 20/Feb/72, W.I. Follett (CAS, 14 dead)¹²⁹; Alameda Creek (37°, 34'N, 121°, 59'W, elev. 12 m), 20,21/Jun/73 (Aceituno et al., 1976: 199, 14: FL 56-348 mm); Alameda Creek (37°, 35'N, 121°, 55'W, elev. 55 m), 20,21/Jun/73 (Aceituno et al., 1976: 199, 5: FL 26-50 mm)¹²³; Alameda Creek (37°, 30'N, 121°, 49'W, elev. 134 m), 20,21/Jun/73 (Aceituno et al., 1976: 199, 6: FL 232-281 mm)¹²²; *Crow Creek, lower reaches, 5,6/Aug/75, CDFG; Arroyo de la Laguna, downstream from bridge at Castlewood Golf Course, 16/Oct/75, CDFG¹⁰¹; Alameda Creek (T4S, R1W, Sec 12), 16/Oct/75, CDFG, numerous¹²⁴; Arroyo de la Laguna, downstream from bridge immediately below Castlewood Golf Course bridge, 13/Nov/75, CDFG, numerous; Arroyo Mocho Creek, Lawrence Laboratory pumping station (NE ¼ of Sec 8, T4S, R3S), 3/Feb/76, CDFG, 7: FL 105-230 mm⁹¹; Arroyo Mocho Creek, Cedar Brook Ranch (SW ¼ of Sec 14, T4S, R3E), 3/Feb/76, CDFG, 10: FL 58-323 mm⁹³; Arroyo de la Laguna Creek, upstream from Bernal Road bridge, 4/Feb/76, CDFG, 8 (+23 not measured): FL 140-272 mm¹⁰⁰; Arroyo de la Laguna Creek, downstream from Castlewood Road bridge,

4/Feb/76, CDFG, 7 (+2 not measured): FL 201-255 mm¹⁰²; Arroyo de la Laguna Creek, 150 yds upstream from confluence with Alameda Creek, 4/Feb/76, CDFG, 1: FL 192 mm¹⁰⁵; Arroyo de la Laguna Creek, 200 yds upstream from Interstate 680 bridge, 9/Apr/76, CDFG, 4: FL 9-10.25 in.⁹⁸; Arroyo de la Laguna Creek, from Interstate 680 bridge downstream, 9/Apr/76, CDFG, 21: FL 8.75-11.50 in.⁹⁹; Redwood Creek, at Redwood Creek fire station, 6/Jun/78, CDFG, 1: FL 13.5 in.¹¹¹; Arroyo Valle Creek, two ponds lying immediately to the S of Shadow Cliffs Reservoir, Jul/78, CDFG; Alameda Creek, 0.5 km upstream from junction with Calaveras Creek (Scoppettone and Smith, 1978: 64)¹²⁰; Arroyo de la Laguna Creek, at Castlewood Road (Scoppettone and Smith, 1978: 64)¹⁰⁴; Arroyo de la Laguna Creek, near mouth (Scoppettone and Smith, 1978: 64)¹⁰⁶; Arroyo Mocho Creek, at Lawrence Laboratory pumping station (Scoppettone and Smith, 1978: 64)⁹²; Redwood Creek, at Redwood Creek fire station, 5/Mar/79, CDFG, 8: FL 8-18 in.¹⁰⁷; Redwood Creek, Pinehurst Road and Redwood Road culvert downstream approximately 475 yds, 10/Apr/79, EBRPD (CDFG), 13: 2-15.6 in.¹⁰⁸; Redwood Creek, upstream from Redwood Park bridge, 21/Mar/80, CDFG, 7: FL 10.8-17.0 in.¹⁰⁹; Redwood Creek, at Redwood Creek fire station, 21/Mar/80, CDFG, 3: FL 14.6-17.1 in.¹¹⁰; San Leandro Creek, at MacArthur Blvd. crossing, 22/Jul/81, L&F, 4: FL 76-121 mm¹¹²; San Leandro Creek, 250 m downstream from MacArthur Blvd. crossing, 22/Jul/81, L&F, 4: FL 96-141 mm¹¹³; San Lorenzo Creek, upstream from junction with 2nd Street, 23/Jul/81, L&F, 15: FL 35-211 mm¹¹⁹; San Lorenzo Creek, 50 m downstream from junction of Crow Creek, 24/Jul/81, L&F, 6: FL 110-163 mm¹¹⁶; Palomares Creek, immediately below Don Castro Dam spillway, 25/Jul/81, L&L, 1: FL 177 mm¹¹⁵; San Lorenzo Creek, pool below Cull Canyon Reservoir spillway, 25/Jul/81, L&L, 3: FL 147-304 mm¹¹⁷; San Lorenzo Creek, 100 m upstream from Hwy 580 crossing, 25/Jul/81, L&L, 2: FL 80-92 mm¹¹⁸; Crow Creek, Crow Creek Road, 1 mile upstream from junction of Cull Canyon Road and Crow Canyon Road, 25/Jul/81, L&L, 7: FL 69-232 mm¹¹⁴; Arroyo Mocho Creek, 0.4 km upstream from BM 2657 on Mines Road (T5S, R4E, Sec 27), 26/Jul/81, L&L, 21: FL 113-307 mm⁹⁴; Arroyo Mocho Creek, downstream from junction with Wente Road (T3S, R2E, Sec 22), 27/Jul/81, L&F, 2: FL 23-114 mm⁹⁰; South San Ramon Creek, upstream from junction with Fwy 580, 30/Jul/81, L&L, 3: FL 92-216

mm⁸⁷; Arroyo Valle Creek, upstream from junction with Hwy 84, 1/Aug/81, L&L, 12: FL 116-181 mm⁹⁵; Arroyo Mocho Creek, downstream from junction with Wente Road (T3S, R2S, Sec 22), L&L, 14: FL 54-99 mm⁸⁹; Arroyo Mocho Creek, 100 m upstream from junction of Hwy 84, 1/Aug/81, L&L, 10: FL 67-275 mm⁸⁸; Alameda Creek, at Sunol Regional Wilderness headquarters (T5S, R2E, Sec 17), 6/Aug/81, L&F, 3: FL 64-151 mm¹²¹; Alameda Creek, at 1st gaging station above Niles (T4S, R1W, Sec 15), 27/Sept/81, L&F, 3: FL 304-354 mm¹³⁰; Alameda Creek, at 1st railroad crossing above Niles (T4S, R1W, Sec 15), 1/Oct/81, L&F, 1: FL 73 mm¹³¹. CONTRA COSTA COUNTY: "Six miles back of Clayton," 3/Jul/27, L.R. Rivas (SU 60178, 1); Marsh Creek, 7.5 miles E of Mt. Diablo, 19/Feb/39, R.R. Miller and J. Davies (SSU 277, 1)³⁸; Marsh Creek, 3 miles E of Livermore, 2/Apr/39, R.R. Miller and J. Davies (SSU 278, 31)³⁹; San Pablo Creek, 6 miles below San Pablo Reservoir, 1/Dec/42, G. Murphy (SU 40791, 69)⁷⁵; Walnut Creek, at Alamo, 19/Dec/42, G. Murphy (SU 40793, 2)⁵¹; San Ramon Creek, 1.8 miles above Walnut Creek (town), 3/Aug/45, W.I. Follett (CAS WIF2235, 58)⁴⁹; Marsh Creek, 0.5 mile E of Marsh Creek Springs Park, 5/Sept/45, D.A. and H. Simpson (CAS 17933, 26)⁴⁰; San Ramon Creek, 3/Sept/45 (CAS 19899, 50+); San Pablo Creek, silt dam, 14/Apr/56, P.R. Needham and Zool. 138 class (UCB, 7); *Bear Creek, 0.5 mile upstream from San Pablo Reservoir, 13/Sept/60, CDFG, 1; Rodeo Creek, 0.25 mile below Hwy 80, 14/Feb/74, CDFG, 11: 4.5-17.5 in.⁵⁴; Rodeo Creek, immediately downstream from Hwy 80 bridge, 14/Feb/74, CDFG, 2⁵⁵; Rodeo Creek, bridge over Rodeo Creek leading to industrial plant, 50 ft from Hwy 4, 14/Feb/74, CDFG⁵⁷; Rodeo Creek, downstream from Hwy 80 at natural rock drop structure, 20/Mar/74, CDFG, 15: FL 2.5-17.6 in.⁵⁶; San Leandro Creek, N branch between road crossings adjacent to firehouse on Moraga Way, 14/Aug/74, CDFG, 20: 1-4 in.⁷⁸; *San Leandro Creek, vicinity of Miramonte High School, 15/Aug/74, CDFG; San Leandro Creek, N branch, near confluence with W branch, 15/Aug/74, CDFG⁷⁹; San Leandro Creek, W branch, at concrete drop structure near entrance to Moraga Country Club, 15/Aug/74, CDFG: 1-5 in.⁸⁰; San Leandro Creek, W branch, second upstream concrete drop structure within Moraga Country Club, 15/Aug/74, CDFG, many: FL 1-5 in.⁸¹; San Leandro Creek, confluence of N and W branches, 15/Aug/74, CDFG, large numbers: 1-5 in.⁸²; San Leandro Creek, N branch, near abandoned labor camp upstream from Moraga Way crossing, 11/Sept/74,

CDFG, 2⁸³; San Leandro Creek, N branch, Moraga Road above junction with St. Mary's Road, 11/Sept/74, CDFG, 15⁸⁴; Pinole Creek, from tidal zone upstream 1.3 miles, 23/Apr/75, CDFG (fish kill), 2, 262: FL 3-8 in., 14: : FL 16-19 in.⁵⁸; *San Pablo Creek, 0.2 mile downstream from Bear Creek Road bridge, 3/Jun/76, CDFG; San Pablo Creek, at confluence with Bear Creek, 4/Jun/76, CDFG, 8: FL 0.8-0.9 in.⁷⁷; *Walnut Creek, near Duncan Street, 20,21/Jul/77, CDFG, a few: FL 6-8 in.; *San Ramon Creek, lower reaches near culvert having confluence with Walnut Creek, 26/Jul/77, CDFG, occasional: FL 4-8 in.; Walnut Creek, below drop structure downstream from Bancroft Road crossing, 23/Jun/78, CDFG, several: 3 in.⁴²; Pinole Creek, at Simas Avenue crossing, 9/Nov/78, CDFG⁶⁵; Pinole Creek, below Castro Ranch Road junction, 6/Nov/79, CDFG, 3: FL 2.2 in.⁶⁸; Pinole Creek, upstream from Pinole Valley Road, N of Ellorhorst intersection, 20/Nov/79, CDFG, 1: FL 5.3 in.⁶⁶; *Alahambra Creek [Arroyo Hambre Creek], 31/Jul/80, CDFG (fish kill); Walnut Creek, 50 m upstream from junction with Pine Creek, 5/Oct/80, L&L, 5: TL 121-180 mm⁴³; Walnut Creek, 50 m upstream from SPRR bridge at Walnut Creek Civic Center, 5/Oct/80, L&L, 2: TL 95-102 mm⁴⁴; San Ramon Creek, immediately below Creekside Drive bridge at USGS gaging station, 5/Oct/80, L&L, 9: TL 260-315 mm⁴⁶; San Ramon Creek, below falls approximately 150 m downstream from junction with Chaney Road, 5/Oct/80, R.A. Leidy, 19: TL 152-381 mm⁴⁷; San Ramon Creek, 0.3 km downstream from Alamo Cemetery off La Gonda Way, 6/Oct/80, L&L, 4: TL 178-318 mm⁵⁰; San Ramon Creek, pool 75 m downstream from junction with Chaney Road, 7/Oct/80, L&F, 8: TL 258-304 mm⁴⁸; Las Trampas Creek, 50 m upstream from junction of Pleasant Hill Road, 12/Oct/80, L&L, 20: TL 102-178 mm⁴⁵; Marsh Creek, at junction with Cypress Road (T2N, R2E, Sec 25), 22/May/81, L&L, 1: FL 513 mm³⁶; Pinole Creek, 100 m upstream from culvert under San Pablo Avenue, 23/Jun/81, L&F, 1: FL 575 mm⁵⁹; Pinole Creek, 200 m downstream from junction with Hwy 80, 23/Jun/81, L&F, 25: FL 80-93 mm⁶⁰; Pinole Creek, 50 m upstream from junction with Hwy 80, 23/Jun/81, L&F, 7: FL 130-145 mm⁶²; Pinole Creek, 175 m upstream from junction with Hwy 80, 23/Jun/81, L&F, 5: FL 100-110 mm⁶³; Pinole Creek, 200 m upstream from junction with Hwy 80, 23/Jun/81, L&F, 50: FL 42-91 mm⁶⁴; Pinole Creek, at junction with Pinole Valley Road, opposite Pinole High School, 23/Jun/81,

L&F, 3: FL 36-48 mm; Pinole Creek, at junction with Pinole Valley Road, immediately above Ellorhorst School, 23/Jun/81, L&F, 15: FL 31-65 mm⁶⁷; Pinole Creek, pool downstream from junction of Pinole Valley Road and Castro Ranch Road, 23,24/Jun/81, L&F, 5: FL 97-188 mm⁶⁹; San Pablo Creek, opposite Rancho School, El Sobrante, 13/Jul/81, L&F, 2: FL 82-91 mm⁷⁶; San Pablo Creek, 50 m upstream from bridge to St. Joseph Cemetery, 13/Jul/81, L&F, 3: FL 135-166 mm⁷⁴; San Pablo Creek, 100 m downstream from junction with San Pablo Avenue, 13/Jul/81, L&F, 4: FL 113-255 mm⁷³; San Pablo Creek, at junction with 13th Street, 13/Jul/81, L&F, 3: FL 116-191 mm⁷²; San Pablo Creek, at SPRR crossing, 13/Jul/81, L&F, 5: FL 81-206 mm⁷⁰; San Pablo Creek, 30 m upstream from junction with 3rd Street, 13/Jul/81, L&F, 2: FL 66-92 mm⁷¹; Moraga Creek, at junction with Old Moraga Way, 5/Aug/81, L&F, 3: FL 37-111 mm⁸⁵; Moraga Creek, immediately downstream from junction with Moraga Road, 7/Aug/81, L&F, 7: FL 44-147 mm⁸⁶; Arroyo Hambre Creek, at Susana Street crossing, Martinez, 24/Aug/81, L&F, 15: FL 65-222 mm⁵²; Arroyo Hambre Creek, at Alhambra Way crossing, 24/Aug/81, L&F, 50: FL 58-206 mm⁵³; Mt. Diablo Creek, at Port Chicago Hwy crossing, 21/Sept/81, L&F, 9: FL 99-192 mm⁴¹. MARIN COUNTY: San Anselmo Creek, San Anselmo (Fry, 1936: 68)⁶; Corte Madera Creek, at Ross, 7/Oct/68, SFSU, 1: 104 mm¹; Corte Madera Creek, bridge at Ross firehouse, 17/Oct/69, SFSU, 9: SL 32-60 mm²; Corte Madera Creek, bridge near Ross firehouse off Sir Francis Drake Blvd., 24/Sept/73, SFSU, 7³; Corte Madera Creek, at Ross, vicinity of bridge over creek adjacent to Ross fire station, 16/Oct/74, 12: 38-54 mm⁴; Novato Creek, at Sutro Avenue, 16/Sept/81, L&F, 50: FL 24-63 mm⁹; Novato Creek, at 7th Street, 16/Sept/81, L&F, 20: FL 47-162 mm¹⁰; Warner Creek, at McIay Road, 17/Sept/81, L&F, 5: FL 23-59 mm⁷; Warner Creek, at Diablo Road crossing, 17/Sept/81, L&F, 1: FL 53 mm⁸; Corte Madera Creek, at Madrone Drive, 18/Sept/81, L&F, 18: FL 28-302 mm⁵. NAPA COUNTY: Saint Helena, 16/Mar/95 (SU 28791, 1)¹⁹; Conn Creek (Snyder, 1908: 158)²²; Napa River, Calistoga (Snyder, 1908: 158)¹³; Napa River, Ruth-erford (Snyder, 1908: 158)²⁴; Suisun Creek, large pools at base of spillway of Lake Curry (Shapovalov, 1940, 13)³³; *Soda Creek, upper Monticello-Rutherford Road crossing, 25/Jun/40, CDFG, abundant; Conn Creek, from BB Ranch downstream 3 miles, 31/Jul/45, CDFG, 2: juveniles; Creek near Yountville, in

old soldiers home, tributary to Napa River, 31/Aug/58, E.W. Kirschbaum, T. Boud, and D. Rentz (CAS, Acc. 1958-VIII: 4); Napa River, mouth of Tulacay Creek, 4/May/59, P.R. Needham and party (CAS 23825, 4: SL 25-110 mm)³¹; *Sage Creek, mouth to headwaters, 7/Aug/56, CDFG, common; *Bear Canyon Creek, above Hwy 29, 19/Oct/58, CDFG; Napa River, at southern limits of Napa, 26/May/65, J.D. Hopkirk, Shimizu, and Evans (CAS, Acc. 1966-VI: 20, 9: SL 25.2-32.2 mm)³²; *Redwood Creek, below junction of Dry Creek, 8,9,10/Jun/66, CDFG, abundant; Outfall from storm drain 100 yds E of Hwy 29 bridge to confluence with Napa River, 15/Jun/67, CDFG (fish kill), 100: 1.2-11.4 in.; *Bell Canyon Creek, Bell Canyon Dam to mouth, 20/Jun/69, CDFG; Napa River, Yountville Cross Road, 28/Jul/69, CDFG²⁶; Napa River, Hwy 128 bridge, 29/Jul/69, CDFG²⁵; Napa River, Zinfandel Lane bridge, 29/Jul/69, CDFG²³; Napa River, Pope Street bridge, 31/Jul/69, CDFG¹⁸; Napa River, Pratt Avenue bridge, 4/Aug/69, CDFG¹⁶; Napa River, Bale Lane bridge, 5/Aug/69, CDFG¹⁵; Napa River, Berry Avenue bridge, 8/Aug/69, CDFG; *Garnett Creek, downstream from Hwy 29 bridge, 16/Jun/70, CDFG; *Garnett Creek, 1/Jul/70, CDFG; Milliken Creek, mouth of Milliken Canyon, CDFG, 1³²; Milliken Creek, junction with Monticello Road, CDFG, numerous fry²⁹; Napa River, Yount Mill Road, 20/Oct/72, P.B. Moyle (UCDPM 72-24, 2); Napa River, 0.5 mile section upstream from Lincoln Avenue bridge in Napa, 1/Nov/73, CDFG, 8: FL 224-488 mm²⁸; *York Creek, below Hwy 29, 13/Jun/74, CDFG; Napa River, from Deer Park Road to 1/3 mile below Pope Street bridge, 16,17/Oct/79, CDFG (fish kill), 1700¹⁷; Napa River, at Dunaweal Lane, 9/Sept/81, L&F, 3: FL 36-62 mm¹⁴; Conn Creek, 1.5 miles above Lake Hennessey, 9/Sept/81, L&F, 4: FL 34-52 mm²⁰; Napa River, at Yountville Cross Road, 10/Sept/81, L&F, 5: FL 80-310 mm²⁷; Redwood Creek, on Redwood Road, 0.25 mile before junction with Brown's Valley Road, 10/Sept/81, L&F, 11: FL 45-105 mm²¹⁰; Chiles Creek, 0.25 mile upstream from junction with Moore Creek, 10/Sept/81, L&F, 4: FL 104-117 mm²¹; Napa Creek, at junction with Jefferson Street, Napa, 12/Sept/81, L&F, 5: FL 32-70 mm²⁹; Tulacay Creek, at Suscol Avenue crossing, 12/Sept/81, L&F, 10: FL 40-197 mm; Milliken Creek, at West Trancos Road crossing, 12/Sept/81, L&F, 3: FL 72-145 mm³⁰; Sarco Creek, at junction with Hwy 121, 12/Sept/81, L&F, 2: FL 52-98 mm³¹. SAN FRANCISCO COUNTY: San Francisco (Girard, 1857:

28). SAN MATEO COUNTY: San Francisco [San Francisquito] Creek, 1/Jan/90, E. Hughs (SU 37015, 16); San Francisquito Creek (Snyder, 1905: 331); Bear Creek, at Sand Hill Road crossing, 3/Jul/74, CDFG, 2: FL 2.0-3.9 in.²⁰⁶; San Francisquito Creek, upstream from Junipero Blvd., 1,2,5/Jul/76, CDFG²⁰²; San Francisquito Creek, Junipero Serra Blvd. crossing, 13/Jul/76, CDFG, 2: FL 4-8 in.²⁰⁰; San Francisquito Creek, Lake Laguna Diversion dam, 13/Jul/76, CDFG, 2: FL 10-10.4 in.²⁰¹; San Francisquito Creek, 75 yds downstream from Junipero Serra Fwy 280, 13/Jul/76, CDFG, 1: FL 11.8 in.²⁰⁴; Bear Creek, upstream from Sand Hill Road crossing, 15/Jul/76, CDFG, 12: FL 4.9-8.3 in.²⁰⁷; Los Trancos Creek, downstream from Felt Lake Diversion dam, 7/Aug/76, CDFG, common²⁰⁵; Bear Creek, immediately upstream from Sand Hill Road crossing, 29/Jun/78, CDFG, 10: FL 1-3 in.¹⁰⁸; San Francisquito Creek, 20 m downstream from Willow Road bridge, 16/Aug/81, L&F, 3: FL 221-222 mm²⁰³; San Mateo Creek, 0.6 km upstream from junction of Crystal Springs Road and Polhemus Road, 17/Aug/81, L&F, 1: FL 102 mm²⁰⁹. SANTA CLARA COUNTY: Isabel Creek, Mt. Hamilton, 30/Jul/98, J.O. Snyder (SU 66230, 1); San Antonio, Stevens, Campbell, Guadalupe, Coyote, Arroyo Hondo, Smith, and Isabel Creeks (Snyder, 1905: 331); Coyote Creek, near Gilroy Hot Springs, 25/Jul/09, U.S. Bureau Fisheries (SU 37010, 149)¹⁴⁸; Guadalupe Creek, San Jose, 30/Sept/22, C.L. Hubbs (UMMZ 63401, 22: 35-61 mm)¹⁸¹; Coyote Creek, San Jose (in city), 1/Oct/22, C.L. Hubbs (UMMZ 63400, 9)¹⁷⁴; Coyote Creek, between Milpitas and Alviso, 24/Oct/22, C.L. Hubbs (UMMZ 63399, 2: 39-55 mm)¹⁷⁸; Coyote Creek, about 5 miles SW of Gilroy Hot Springs, 25/Apr/25, (SU 37009, 24)¹⁶⁰; Coyote Creek, at Madrone bridge, 25/May/27, A.C. Taft (SU 20801, 54)¹⁵⁸; Coyote Creek, above Madrone swimming hole, 11/Oct/27, D.H. Fry (SU 37008, 1)¹⁵⁹; Coyote Creek (Fry, 1936: 67); Guadalupe Creek (Fry, 1936: 67); Calero Creek, tributary to Guadalupe Creek, 8/Jul/38, A.C. Taft and L. Shapovalov (CAS 14206, 49)¹⁸²; Coyote Creek, at Calif. Hwy. 9 (opposite Milpitas), 2/Aug/44, W.I. Follett (CAS 18603, 5)¹⁸⁰; Unnamed tributary to Coyote Creek, 1 mile E of Hwy 101, 19/May/45, D. Simpson and R.R. Harry, Jr. (CAS 13263, 14)¹⁶⁹; Coyote Creek, 1 mile N of Coyote on Hwy 101 at red bridge, 19/May/45, D. Simpson and R.R. Harry, Jr. (CAS 13264, 87)¹⁶⁶; Coyote Creek, 300 yds below Coyote dam at Coyote Lake, 23/Aug/45,

D.A. and H. Simpson (CAS 13267, 20)¹⁵⁵; Coyote River, at junction of Cochran Road and Malaguira Road, between Madrone and Morgan Hill, 24/Aug/45, D.A. and H. Simpson (CAS 13268, 2)¹⁵⁷; Coyote River, about 6 miles S of San Jose, near stone quarry, 24/Aug/45, D.A. and H. Simpson (CAS 13273, 1)¹⁷¹; Coyote River, on Hwy 101, 1.5 miles N of Coyote at concrete dam, 24/Aug/45, D.A. and H. Simpson (CAS 13276, 6)¹⁶⁶; Coyote River, on Hwy 101 at old service station at N Coyote, 24/Aug/45, D.A. and H. Simpson (CAS 13283, 3)¹⁶⁷; Coyote River, at N Coyote just S of junction of unnamed creek on E side of Hwy 101, 25/Aug/45, D.A. and H. Simpson (CAS 13286, 177)¹⁶⁸; Coyote River, 25/Aug/45, D.A. Simpson (CAS 18725, 25); Coyote Creek, 0.4 mile by road downstream from junction of Gilroy Hot Springs Road and Canada Road (T10S, R4E, Sec 12), 23/Jul/53, T.J. Merkel (CAS 20968, 3)¹⁵²; Coyote Creek, 1.4 miles by road downstream from junction of Gilroy Hot Springs Road and Canada Road (T10S, R4E, Sec 11), 23/Jul/53, T.J. Merkel (CAS 20970, 1)¹⁸²; Calero Reservoir, outlet at McKean Road crossing (T8S, R2E, Sec 31), 24/Jul/53, T.J. Merkel (CAS 20976, 1)¹⁸²; Guadalupe Creek, at Coleman Road X-ing in T8S, R1E, Sec 19, 24/Jul/53, T.J. Merkel (CAS 20966, 5)¹⁸⁷; Guadalupe Creek, upstream from Kelsey Pond, Oct/56 (SJSU, GD-5); Guadalupe Creek, Hicks Road, 29/Oct/57, (SJSU, GD-28); Coyote Creek, 0.8 mile below Gilroy Hot Springs, 12/May/64, W.I. Follett (CAS, 1)¹⁵⁰; Coyote Creek, 5/Nov/64, (SJSU, CD-28); *Coyote Creek, from Coyote Reservoir upstream 8.2 miles to center of Sec 24 of T9S, R4E, 18/Mar/65, CDFG, 35: 6-8 in.; Coyote Creek, between Coyote Reservoir and Gilroy Hot Springs, 5/Sept/65, R.N. and M. Lea (CAS, Acc. 1967-I: 9, 18); Coyote Creek, 7/Mar/72, R.L. Hassur (SJSU); Coyote Creek, (37°, 13'N, 121°, 45'W, elev. 58 m), 21/Jun/73 (Aceituno et al., 1976: 203, 8: FL 32-223 mm)¹⁷³; Coyote Creek, middle fork (Guzzetta, 1974: 28)¹⁴⁵; Coyote Creek, east fork (Guzzetta, 1974: 28)¹⁴⁷; Coyote Creek, 100 yds below Berryessa Road, 23/Sept/75, CDFG, 20: FL 3-11 in.¹⁷⁶; Coyote Creek, 100 yds upstream from Oakland Road bridge, 23/Sept/75, CDFG, 4: FL 4-8 in.¹⁷⁷; Guadalupe Creek, downstream from Guadalupe Dam, 14/Nov/75, CDFG, numerous; *Coyote Creek, downstream from confluence of Upper Penitencia Creek, 19/May/77, CDFG, numerous; Stevens Creek, Stevens Creek Road bridge nearest Stevens Canyon Road, 8/May/78, CDFG, 7:

FL 5-7 in.¹⁹⁴; Coyote Creek, middle fork, Coe State Park (Scoppettone and Smith, 1978: 63)¹⁴⁶; Coyote Creek, Gilroy Hot Springs (Scoppettone and Smith, 1978: 63)¹⁴⁹; Coyote Creek, below Coyote Reservoir (Scoppettone and Smith, 1978: 63)¹⁵⁴; Coyote Creek, below Anderson Reservoir (Scoppettone and Smith, 1978: 63)¹⁵⁶; Coyote Creek, above percolation ponds, 2 km below Anderson Reservoir (Scoppettone and Smith, 1978: 63)¹⁶¹; Coyote Creek, Riverside Golf Course Road (Scoppettone and Smith, 1978: 63)¹⁶²; Coyote Creek, upstream from Metcalf Road (Scoppettone and Smith, 1978: 63)¹⁷⁰; Coyote Creek, Tennant Road (Scoppettone and Smith, 1978: 63)¹⁷²; Coyote Creek, mouth of Penitencia Creek (Scoppettone and Smith, 1978: 63)¹⁷⁵; Isabel Creek, Kincaid Road (Scoppettone and Smith, 1978: 63)¹⁴⁰; Smith Creek, Mt. Hamilton Road (Scoppettone and Smith, 1978: 63)¹⁴¹; Arroyo Hondo Creek (Scoppettone and Smith, 1978: 63)¹³⁹; Isabel Creek, at junction with San Antonio Road (T7S, R3E, Sec 1), 13/Aug/81, L&F, 1: FL 59 mm¹⁴³; Smith Creek, at junction with Mt. Hamilton Road, 13/Aug/81, L&F, 1: FL 60 mm¹⁴²; Arroyo Bayo Creek, 1.2 km E of BM 1924 on San Antonio Road (T7S, R4E, Sec 5), 13/Aug/81, L&F, 17: FL 82-214 mm¹⁴⁴; Stevens Creek, at Homestead Road (T7S, R2W, Sec 10), 19/Aug/81, L&F, 7: FL 51-84 mm¹¹⁵; Stevens Creek, 25 m downstream from junction of Stevens Creek Road, 18/Aug/81, L&F, 4: FL 62-123 mm¹⁹³; Stevens Creek, 25 m upstream from junction with Stevens Creek Road, 19/Aug/81, L&F, 1: FL 149 mm¹⁹²; Stevens Creek, at Stevens Creek County Park, 100 m upstream from gaging station, 19/Aug/81, L&F, 13: FL 92-340 mm¹⁹¹; Stevens Creek, 20 m below 1st bridge above Stevens Creek Reservoir on Eden Road, 20/Aug/81, L&F, 2: FL 48-49 mm¹⁹⁰; Permanente Creek, immediately downstream from junction of Foothill Expressway, 20/Aug/81, L&F, 53: FL 32-48 mm¹⁹⁸; Permanente Creek, 20 m downstream from junction with Portland Avenue, 20/Aug/81, L&F, 150: FL 51-162 mm¹⁹⁹; Saratoga Creek, at Crestbrook Drive off Saratoga Avenue, 21/Aug/81, L&F, 50: FL 45-78 mm¹⁹⁶; Los Gatos Creek, at junction with Lark Avenue, off Hwy 17, 25/Aug/81, L&F, 6: FL 42-321 mm¹⁸⁹; Guadalupe River, at Camden Avenue, 26/Aug/81, L&F, 3: FL 57-92 mm¹⁸⁵; Guadalupe River, at USGS gaging station on Hicks Road, 26/Aug/81, L&F, 2: FL 47-52 mm¹⁸⁴; Guadalupe River, 50 m below Guadalupe Dam, 26/Aug/81, L&F, 2: FL 33-79 mm¹⁸³; Alamitos Creek, junction of Graystone Lane off Camden Avenue, 3/Sept/81,

L&F, 5: FL 30-62 mm¹⁸⁶; Fisher Creek, at Bailey Avenue crossing, 5/Sept/81, L&F, 10: FL 62-132 mm¹⁶⁴; Fisher Creek, 20 m upstream from junction with Santa Teresa Blvd., 5/Sept/81, L&F, 4: FL 47-67 mm¹⁶³; Coyote Creek, 6.12 miles E on Gilroy Hot Springs Road from junction with Canada Road (T10S, R5E, Sec 6), 5/Sept/81, L&F, 3: FL 27-37 mm¹⁵¹; Permanente Creek, 20 m upstream from junction with Fwy 280, 7/Sept/81, L&F, 75: FL 32-137 mm¹⁹⁷. SOLANO COUNTY: Green Valley Creek, at Mason Road crossing, 2/Oct/81, L&L, 1: FL 378 mm³⁵; Suisun Creek, at Lake Curry Gate on Lakeside Road, 2/Oct/81, L&L, 1: FL 162 mm³⁴. SONOMA COUNTY: *Lichau Creek, lower section, 17,18/Jul/68, CDFG; *Calabazas Creek, 12/Sept/75, CDFG; Sonoma Creek, 0.5 mile down Warm Springs Road from junction with Hwy 12, 14/Sept/81, L&F, 5: FL 42-72 mm¹¹; Sonoma Creek, at junction with West Watmaugh Road, 15/Sept/81, L&F, 75: FL 24-172 mm¹²; Willow Brook, Penngrove (J.D. Hopkirk, personal communication).

Ictalurus catus

Distributional Records. ALAMEDA COUNTY: Alameda Creek, 0.2 mile above WPRR bridge below Niles, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS, 2: halfgrown)¹⁰; Arroyo Valle Creek, two ponds lying immediately to the south of Shadow Cliffs Reservoir, Jul/78, CDFG⁹. CONTRA COSTA COUNTY: Pinole Creek, above tidal zone upstream 1.3 miles, 23/Apr/75, CDFG (fish kill), 1: FL 10.1 in.⁸; Walnut Creek, 50 m upstream from junction with Pine Creek, 5/Oct/80, L&L, 13: TL 140-152 mm⁷. NAPA COUNTY: Napa River, Imola (lat. 38°, 16', 44", long. 122°, 16', 49"), W.I. Follett (CAS, Acc. 1926, 1: TL 11 in.)⁶; Napa River, Imola, 24/Apr/27, W.I. Follett (CAS, Acc. 1927, 1: 11.75 in.)⁵; Napa River, Zinfandel Lane bridge, 29/Jul/69, CDFG²; Napa River, Hwy 128 bridge, 29/Jul/69, CDFG³; Napa River, Pope Street bridge, 31/Jul/69, CDFG¹; Napa River, 0.5 mile section upstream from Lincoln Avenue bridge, Napa, 1/Nov/73, CDFG, 2: FL 244-328 mm⁴. SOLANO COUNTY: Mare Island (introduced), as Ameiurus catus (Evermann, 1910: 133).

Ictalurus melas

Distributional Records. ALAMEDA COUNTY: Alameda Creek, opposite Sunol Regional Wilderness headquarters, 16/Aug/81, L&F, 1: FL 152 mm⁹. CONTRA COSTA COUNTY: Walnut Creek, 50 m upstream from junction with Pine Creek, 5/Oct/80, L&L, 2: TL 220-245 mm³; San Ramon Creek, immediately downstream from Creekside Drive bridge at USGS gaging station, 5/Oct/80, L&L, 2: TL 241-254 mm⁴; San Ramon Creek, below falls, 150 m downstream from junction with Chaney Road crossing, 5/Oct/80, L&L, 17: TL 152-508 mm⁵; San Ramon Creek, 0.3 km downstream from Alamo Cemetery off La Gonda Way, 6/Oct/80, L&L, 6: TL 203-305 mm⁷; San Ramon Creek, pool 75 m downstream from junction with Chaney Road crossing, 17/Oct/80, L&F, 2: TL 240-250 mm²; Grayson Creek, 50 m upstream from Hwy 24 crossing, 12/Oct/80, L&L, 6: 40-127 mm⁶; San Ramon Creek, opposite Saint Isadore School, Danville, 10/Oct/81, R.A. Leidy, 1: TL 266⁸. NAPA COUNTY: Sage Creek, at milepost 11.68 on Hwy 128 above Lake Hennessey, 10/Sept/81, L&F, 12: TL 65-110 mm¹. SANTA CLARA COUNTY: Guadalupe Creek, near railroad crossing downstream from Willow Avenue, 1981 (J. Smith, personal communication)¹⁰.

Ictalurus nebulosus

Distributional Records. ALAMEDA COUNTY: Alameda Creek near Niles nursery, 31/Oct/58, W.I. Follett and G.M. Peckham (CAS, 1)⁶; Alameda Creek, near hwy bridge E of Niles, 18/Aug/61, J.D. Hopkirk and party (CAS, Acc. 1961-IX: 2, common)⁷; San Lorenzo Creek at junction with 2nd Street, Hayward, 23/Jul/81, L&F, 1: FL 134 mm⁵. CONTRA COSTA COUNTY: Pinole Creek, above tidal zone upstream 1.3 miles, 23/Apr/75, CDFG (fish kill), 1: FL 7.3 in.²; San Pablo Creek, 30 m upstream from bridge to St. Joseph's Cemetery, San Pablo, 13/Jul/81, L&F, 2: FL 117-305 mm³; San Pablo Creek, 100 m downstream from San Pablo Avenue bridge, 13/Jul/81, L&F, 1: FL 206 mm⁴. SAN MATEO COUNTY: San Francisco Creek drainage, Mar/56 (SJSU, SF-4). SANTA CLARA COUNTY: Coyote Creek, 22/Jan/56 (SJSU, CD-14); Guadalupe River, immediately downstream from Hwy 17 crossing opposite San Jose Municipal Airport, 30/Aug/81, L&L, 4: FL

77-82 mm⁹; Coyote Creek, 25 m upstream from junction with Metcalf Road, 3/Sept/81, L&F, 1: FL 176 mm⁸. SONOMA COUNTY: Petaluma River, 25 m upstream from Hardin Lane crossing, 16/Sept/81, L&F, 4: FL 100-137 mm¹.

Ictalurus punctatus

Distributional Records. SANTA CLARA COUNTY: Coyote Creek, 27/Oct/66, R.L. Hassur (SJSU).

Lucania parva

Distributional Records. ALAMEDA COUNTY: Alameda Creek, at bridge on Hesperian Blvd. N of Alvarado, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 4: SL 20-25 mm)¹⁰; Cerrito Creek, at Pierce Road, 9/Jul/81, L&F, 5: FL 12-42 mm⁹. CONTRA COSTA COUNTY: Walnut Creek, immediately downstream from Hwy 4 crossing, 5/Oct/80, L&L, 1: TL 36 mm⁵; Grayson Creek, 50 m upstream from Hwy 24 crossing, 12/Oct/80, L&L, 1: TL 36 mm⁶; Garrity Creek, 0.25 mile upstream from AT and SF railroad crossing above San Pablo Bay (T2N, R4W, Sec 20), 7/Jul/81, L&F, 41: TL 17-35 mm⁸; Arroyo Hambra Creek, at Berkeley Street, Martinez, 24/Aug/81, L&F, 25: TL 17-34 mm⁷. MARIN COUNTY: Corte Madera Creek, 28/Nov/58, E.W. Kirschbaum (CAS 26357, 4); Corte Madera Creek, 27/Jun/59, E.W. Kirschbaum (CAS 26359, 14); Corte Madera Creek, 10/Oct/59, E.W. Kirschbaum and D. Rentz (CAS 26384, 114); Corte Madera Creek, 6/Dec/59, E.W. Kirschbaum, D. Rentz, and T. Dever (CAS, Acc. 1959-XIII: 6, 117: 15-30 mm); Mill Valley [Creek?], 6/Dec/59, E.W. Kirschbaum, D. Rentz, and T. Dever (CAS, Acc. 1959-XIII: 6, 121: 15-28 mm); Corte Madera Creek, vicinity of Kentfield bridge, 50 yds downstream, 28/Oct/61, E.W. Kirschbaum (CAS, Acc. 1961-XI: 26, 1: SL 24 mm); Corte Madera Creek, at Lagunitas Road bridge, just W of Ross City Hall, 1/Nov/63, SFSU, 11; Unnamed creek through Larkspur, at junction with Diane Lane, 18/Sept/81, L&F, 125: TL 16-35 mm². NAPA COUNTY: American Canyon Creek, at end of Elliot Road (T4N, R4W, Sec 25), 19/Sept/81, L&F, 5: TL 16-39 mm⁴. SAN MATEO COUNTY:

San Francisquito Creek, 100 m upstream from Hwy 101 crossing, 15/Aug/81, L&F, 250: TL 27-37 mm¹⁸; Belmont Creek, immediately downstream from Industrial Road (T5S, R4W, Sec 2), 17/Aug/81, L&F, 2: TL 23-30 mm²²; Sanchez Creek, at SPRR crossing, 23/Aug/81, L&F, 50: TL 15-24 mm²¹; Laurel Creek, at city park at end of Casanova Drive, 23/Aug/81, L&F, 25: TL 17-38 mm²⁰; Cordilleras Creek, at Grant-Industrial Road, 23/Aug/81, L&F, 50: TL 15-32 mm¹⁹. SANTA CLARA COUNTY: San Francisquito Creek drainage, downstream from golf course, 4/Nov/77 (SJSU, SF-16)¹⁷; Matadero Creek, at junction with frontage road immediately downstream from Bayshore freeway, 18/Aug/81, L&F, 17: TL 18-27 mm¹⁶; Adobe Creek, at frontage road on W side of Hwy 101, 18/Aug/81, L&F, 5: TL 18-28 mm¹⁵; Permanente Creek, at Charleston Blvd. (T6N, R2W, Sec 9), 20/Aug/81, L&F, 12: TL 21-33 mm¹⁴; Saratoga Creek, at Mission College Blvd. (T6S, R1W, Sec 21), 21/Aug/81, L&F, 2: TL 22-28 mm¹³; Guadalupe River, near Industrial Parkway, off Alviso Road between Trimble Road and Montague Expressway, 30/Aug/81, L&F, 50: TL 11-23 mm¹²; Coyote Creek, at Trimble Road crossing, 31/Aug/81, L&F, 2: TL 34-37 mm¹¹. SONOMA COUNTY: Slough north of Sears Point Road, 4/Jun/63, J.D. Hopkirk and C.C. Swift (?CAS, 9: SL 21-29 mm; J.D. Hopkirk, personal communication).

Gambusia affinis

Distributional Records. ALAMEDA COUNTY: Alameda Creek, ca. 100 yds below railroad bridge, Niles, 21/Oct/55, W.I. Follett and G.M. Peckham (CAS, Acc. 1955-X: 31, several adults)⁶⁹; Alameda Creek, near hwy bridge E of Niles, 18/Aug/61, J.D. Hopkirk, S. Mathews, and R. Behnke (CAS 22881, 1: SL 29 mm)⁶⁸; Arroyo de la Laguna Creek, 3 miles N of Sunol, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 6: SL 22-40 mm)⁶⁶; Alameda Creek, at bridge on Hesperian Blvd., N of Alvarado, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 25: SL 18-36 mm)⁷³; Creek tributary to Alameda Creek, Lowry Road and SPRR, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 7: SL 24-34 mm)⁷¹; Alameda Creek (lat 37°, 34', long. 122°, 03'), 20,21/Jun/73

(Aceituno et al., 1976: 199, 14: FL 20-46 mm)⁷⁰; San Lorenzo Creek, pool immediately below Don Castro Dam, 4,5/Aug/75, CDFG⁵⁰; Cordonices Creek, at Golden Gate Fields Racetrack, 7/Jul/81, L&F, 3: TL 14-31 mm⁴⁶; Cerrito Creek, 50 m downstream from junction with Adams Drive, El Cerrito-Albany City boundary, 9/Jul/81, L&F, 352: TL 15-57 mm⁴⁴; Cerrito Creek, at Pierce Road, 9/Jul/81, L&F, 50: TL 15-63 mm⁴⁵; Arroyo Viejo Creek, south branch, at junction with Golf Links Road, Oakland, 22/Jul/81, L&F, 50: TL 15-32 mm⁴⁷; San Lorenzo Creek, north branch, upstream from junction with Grove Way, 24/Jul/81, L&F, 15: TL 15-33 mm⁴⁸; San Lorenzo Creek, junction of north and middle forks, 0.4 km downstream from Grove Way, Hayward, 24/Jul/81, L&F, 4: TL 15-23 mm⁴⁹; Eden Canyon Creek, at first crossing of Eden Canyon Road off Hwy 580, 25/Jul/81, L&L, 100: TL 19-60 mm⁵²; Cull Creek, 30 m upstream from USGS gaging station above Cull Canyon Reservoir, 25/Jul/81, L&L, 20: TL 16-27 mm⁵¹; Arroyo las Positas Creek, 100 m upstream from junction with Cayetano Creek, 26/Jul/81, L&L, 10: TL 15-35 mm⁵⁸; Arroyo las Positas Creek, 200 m downstream from junction with Cayetano Creek (T3S, R2E, Sec 6), 26/Jul/81, L&L, 25: TL 17-60 mm⁵⁷; Altamont Creek, at 2nd upstream crossing of Blue Belle Drive (T2S, R4E, Sec 34), 26/Jul/81, L&L, 100: TL 16-54 mm⁶⁰; Altamont Creek, at junction with south branch and Blue Belle Drive, near Springtown Country Club (T2S, R2E, Sec 34), 26/Jul/81, L&L, 150: TL 16-37 mm⁵⁹; Arroyo Mocho Creek, 0.4 km upstream from BM 2657 on Mines Road (T5S, R4E, Sec 27), 26/Jul/81, L&L, 20: TL 19-42 mm⁶³; Arroyo Mocho Creek, 0.7 km downstream from BM 2470 on Mines Road, 26/Jul/81, L&L, 16: TL 16-37 mm⁶⁴; Arroyo Mocho Creek, at junction with Hopyard Road, Pleasanton, 30/Jul/81, L&F, 2000: TL 13-29 mm⁵⁶; South San Ramon Creek, at Montevideo Road, 30/Jul/81, L&F, 2000: TL 16-60 mm⁵³; South San Ramon Creek, downstream from Alcosta Blvd., 30/Jul/81, L&F, 250: TL 22-35 mm⁵⁴; South San Ramon Creek, pool immediately upstream from Fwy 580 crossing, 30/Jul/81, L&F, 15: TL 15-30 mm⁵⁵; Arroyo Valle Creek, upstream from Hwy 84, 1/Aug/81, L&L, 10: TL 16-39 mm⁶⁵; Arroyo Mocho Creek, at Wente Road (T3S, R2E, Sec 22), 1/Aug/81, L&L, 50: TL 18-38 mm⁶²; Arroyo Mocho Creek, 100 m upstream from junction with Hwy 84, 1/Aug/81, L&L, 52: TL 14-50 mm⁶¹; Alameda Creek, at crossing of Alvarado-Niles Road and Dyer Street, 21/Sept/81,

L&F, 200: TL 13-62 mm⁷²; Alameda Creek, below spillway opposite USGS gaging station, Niles Canyon (T4S, R1E, Sec 7), 1/Oct/81, L&F, 15: TL 27-41 mm⁶⁷.

CONTRA COSTA COUNTY: Walnut Creek, at Alamo, 19/Dec/42, G. Murphy (SU 40832, 9)²⁴; San Ramon Creek, 1.8 miles above Walnut Creek (town), 3/Aug/45, W.I. Follett (CAS 19904, 25)²⁵; Marsh Creek, 0.5 mile E of Marsh Creek Springs Park, 5/Sept/45, D.A. and H. Simpson (CAS 17932, 15)²¹; *Rodeo Creek, bridge over creek leading to industrial plant, 50 ft from Hwy 4, 14/Feb/74, CDFG, 50+; San Leandro Creek, lower reaches, 12/Aug/75, CDFG, abundant; Marsh Creek, series of pools below Deer Valley Road, 19/Aug/71, CDFG²⁰; *Tice Creek, 400 ft upstream from culvert under Tice Valley Blvd., 12/Jul/76, CDFG; *Walnut Creek, near Duncan Street, Concord, 20,21/Jul/77, CDFG; *Pine Creek, 28/Jul/77, CDFG, abundant; Pinole Creek, Pinole Valley Road, N of the Ellorhorst intersection, 20/Nov/79, EDFG, 1: FL 1.6 in.³⁹; Walnut Creek, 50 m upstream from junction with Pine Creek, 5/Oct/80, L&L, 5: TL 13-25 mm²⁹; San Ramon Creek, at junction of Sycamore Valley Road, 6/Oct/80, L&L, 1: TL 32 mm²⁸; Sycamore Creek, 1 km upstream from junction of Tassajara and Sycamore Valley Road, San Ramon, 6/Oct/80, L&L, 10: TL 25-32 mm²³; Grayson Creek, 50 m upstream from Hwy 24 crossing, 12/Oct/80, L&L, 50: TL 44-55 mm³⁰; Marsh Creek, downstream from junction with Hwy 4 (T1N, R3E, Sec 7), 11/May/81, L&L, 4: TL 47-54 mm¹⁶; Marsh Creek, 0.45 km on Marsh Creek Road W of junction with Orchard Lane, 11/May/81, L&L, 2: TL 40-46 mm¹⁸; Marsh Creek, 1.4 km S of junction of Marsh Creek Road and Morgan Territory Road (T1N, R1E, Sec 33), 22/May/81, L&L, 20: TL 20-35 mm²²; Marsh Creek, 0.9 km SE of junction of Marsh Creek and Deer Valley Roads, 22/May/81, L&L, 32: TL 17-52 mm¹⁹; Marsh Creek, at Dainty Road, 22/May/81, L&L, 100: TL 20-40 mm¹⁷; Marsh Creek, at Cypress Road (T2N, R2E, Sec 25), 22/May/81, L&L, 31: TL 20-30 mm¹⁵; Rodeo Creek, at junction with 2nd Street, 18/Jun/81, L&F, 1: TL 30 mm³²; Rodeo Creek, 0.3 km downstream from Hwy 80, 18/Jun/81, L&F, 20: TL 20-42 mm³³; Rodeo Creek, 0.5 km upstream from Hwy 80, 18/Jun/81, L&F, 6: TL 15-25 mm³⁴; Rodeo Creek, 0.6 km downstream from Franklin Canyon Golf Course, 18/Jun/81, L&F, 30: TL 17--3 mm³⁶; Rodeo Creek, 59 m upstream from SFRR crossing, 20/Jun/81, L&F, 51: TL 15-25 mm³⁵; Pinole Creek, 0.5 km downstream from AT + SF railroad crossing, 23/Jun/81, L&F, 7: TL 22-57 mm³⁷;

Pinole Creek, 100 m upstream from culvert under San Pablo Avenue, 23/Jun/81, L&F, 50: TL 20-40 mm³⁸; Garrity Creek, 0.25 mile upstream from AT + SF railroad crossing above San Pablo Bay (T2N, R4W, Sec 20), 7/Jul/81, L&F, 30: TL 20-57 mm⁴¹; Garrity Creek, 25 m upstream from SPRR bridge, 7/Jul/81, L&F, 5: TL 40-50 mm⁴²; Garrity Creek, 1 km upstream from SPRR bridge, 7/Jul/81, L&F, 45: TL 20-62 mm⁴³; San Pablo Creek, at Devila Road, 12/Jul/81, L&F, 200: TL 15-40 mm⁴⁰; Arroyo Hambra Creek, at Alhambra Way, 24/Aug/81, L&F, 25: TL 15-31 mm³¹; Pine Creek, at end of Robin Lane, Concord, 21/Sept/81, L&F, 100: TL 16-35 mm²⁷; Mt. Diablo Creek, at Kirker Pass Road (T1N, R1W, Sec 10), 21/Sept/81, L&F, 50: TL 16-23 mm²⁶. MARIN COUNTY: Novato Creek, at bridge 27-01 on Hwy 101, 19/Jul/45, D. Simpson (CAS 12996, 6)⁶; Corte Madera Creek, 28/Nov/58, E.W. Kirschbaum, D. Rentz, and T. Dever (CAS, Acc. 1958-XI: 29, 1); Corte Madera Creek, 6/Jul/59, E.W. Kirschbaum, D. Rentz, T. Dever (CAS, Acc. 1959-XIII: 6, 2); Mill Valley [Creek?], 6/Jul/59, E.W. Kirschbaum, D. Rentz, and T. Dever (CAS, Acc. 1959-XIII: 6, 1); Corte Madera Creek, 10/Oct/59, E.W. Kirschbaum (CAS); Corte Madera Creek, at Lagunitas Road bridge, just W of Ross City Hall, 1/Nov/63, SFSU, 74²; Corte Madera Creek, bridge at Ross, 9/Oct/67, SFSU, 22: 22-38.5 mm³; Corte Madera Creek, at Ross, 7/Oct/68, SFSU, 16: 12-35 mm⁴; *Stemple Creek (Estero de San Antonio), 14/Jul/76, CDFG; San Antonio Creek, 0.25 mile upstream from Hwy 101 (T4N, R7W, Sec 23), 16/Sept/81, L&F, 10: TL 15-22 mm⁸; Novato Creek, at 7th Street, 16/Sept/81, L&F, 3: TL 21-47 mm⁷; Unnamed creek through Larkspur at junction with Diane Lane, 18/Sept/81, L&F, 2000: TL 17-61 mm¹; Unnamed creek S of Pt. Pedro at junction with Castlewood Drive, 19/Sept/81, L&F, 100: TL 15-57 mm⁵. NAPA COUNTY: Napa River, 1/Apr/60, J.D. Hopkirk, Seegrist, and P.R. Needham (CAS 23833, 1: SL 23 mm); *Hinman Creek, tributary to Dry Creek, 600 yds below garbage dump, 23,25/Jun/66, CDFG; *Suscol Creek, Hwy 29 bridge, 1500 ft upstream, 26/Jun/73, CDFG; Conn Creek, at milepost 8.07 E on Hwy 128, 10/Sept/81, L&F, 2: TL 20-27 mm¹²; Brown's Valley Creek, at Buhman Avenue, 12/Sept/81, L&F, 3: TL 17-23 mm¹¹; American Canyon Creek, at end of Elliot Road (T4N, R4W, Sec 25), 19/Sept/81, L&F, 5000: TL 15-61 mm¹³. SAN MATEO COUNTY: *San Francisquito Creek, several hundred yards from Hwy 101, 1,2,5/Jul/76, CDFG; San Francisquito Creek, 100 m upstream from Hwy 101 crossing,

15/Aug/81, L&F, 2000: TL 16-53 mm¹³²; Redwood Creek, north branch at Middlefield Road, 15/Aug/81, L&F, 1500: TL 16-34 mm¹³³; Redwood Creek, north branch at Jones Avenue, Redwood City, 15/Aug/81, L&F, 500: TL 14-27 mm¹³⁴; Arroyo Ojo Creek, at Stulsaft Park, Redwood City, 15/Aug/81, L&F, 1: TL 57 mm¹³⁵; Unnamed Creek at Delaware Road opposite San Mateo County Fairgrounds (T4S, R4W, Sec 28), 23/Aug/81, L&F, 250: TL 18-55 mm¹³⁹; Laurel Creek, at Otay Avenue, Belmont, 23/Aug/81, L&F, 1000: TL 17-42 mm¹³⁷; Laurel Creek, city park at end of Casanova Drive, Belmont, 23/Aug/81, L&F, 1000: TL 20-52 mm¹³⁸; Cordilleras Creek, at Grant-Industrial Road, 23/Aug/81, L&F, 10: TL 16-30 mm¹³⁶. SANTA CLARA COUNTY: Coyote Creek, opposite Milpitas (lat. 37°, 25', 20"N, long. 121°, 55', 30"W), 21/Oct/41, W.I. Follett (CAS 18610, 20)⁸⁴; Calero Reservoir, outlet at McKean Road crossing (T8S, R2E, Sec 31), 24/Jul/53, T.J. Merkel, (CAS 20978, 1)¹²¹; Coyote Creek, Tully Road, 3/Mar/60 (SJSU, CD-18)⁹⁵; Coyote Creek, 7/Mar/72, R.L. Hassur (SJSU); Coyote Creek (lat. 37°, 25', long. 121°, 55'), 21/Jun/73 (Aceituno et al., 1976: 205, 7: FL 16-19 mm)⁸⁷; *Fisher Creek, mouth to Tildon Avenue, 23/Jun/75, CDFG; *Lower Silver Creek, Thompson Creek, to mouth, 6.3 miles, 16/Jul/75, CDFG, numerous; *Calera Creek, near confluence with Berryessa Creek, 16/Jul/75, CDFG; *Berryessa Creek, 0.75 mile upstream from mouth, 16/Jul/75; *Stevens Creek, below Hwy 101, 25,28/Jul/75, CDFG; *Upper Silver Creek, lower farm pond, 19/Aug/75, CDFG; Coyote Creek, Hwy 101 bridge at Hellyer County Park, 23/Sept/75, CDFG⁹⁷; Coyote Creek, northern portion of Hellyer Park, downstream from Sylvandale Road, 23/Sept/75, CDFG⁹⁸; Coyote Creek, Happy Hollow Park, 50 yds upstream from Storey Road, 23/Sept/75, CDFG⁹³; Coyote Creek, 100 yds below Berryessa Road, 23/Sept/75, CDFG, numerous⁹⁰; Coyote Creek, 100 yds upstream from Oakland Road bridge, near San Jose Munciple Golf Course, 23/Sept/75, CDFG, numerous⁸⁹; Coyote Creek, Hwy 237, 23/Sept/75, CDFG⁸⁵; Guadalupe Creek, Brokaw Road crossing, 26/Sept/75, CDFG¹¹¹; Guadalupe River, West Taylor Street bridge, 26/Sept/75, CDFG, 30: FL 1-2 in.¹⁰⁹; Guadalupe River, Willow Glen Way, 26/Sept/75, CDFG, numerous: 1-3 in.¹¹³; Guadalupe River, Alma Street bridge, 26/Sept/75, CDFG, numerous: 1-3 in.¹¹²; *Stevens Creek, below Hwy 101 bridge, 29/Dec/75, CDFG; *Coyote Creek, 19/May/77, CDFG; Coyote Creek, below Anderson Reservoir (Scoppettone and Smith, 1978: 63)¹⁰⁵; Coyote Creek, Riverside Golf

Course Road (Scoppettone and Smith, 1978: 63)¹⁰⁴; Coyote Creek, Tennant Road (Scoppettone and Smith, 1978: 63)¹⁰²; Coyote Creek, above and below Hellyer Park (Scoppettone and Smith, 1978: 63)⁹⁹; Coyote Creek, Singleton Road (Scoppettone and Smith, 1978: 63)¹⁰¹; Coyote Creek, Happy Hollow City Park (Scoppettone and Smith, 1978: 63)⁹⁴; Coyote Creek, mouth of Penitencia Creek (Scoppettone and Smith, 1978: 63)⁹¹; Coyote Creek, Hwy 237 (Scoppettone and Smith, 1978: 63)⁸⁶; Lower Penitencia Creek, at junction of S Main Street and Capitol Avenue, 11/Aug/81, L&F, 200: TL 20-60 mm⁸⁰; Berryessa Creek, at junction of N Main Street, Milpitas, 11/Aug/81, L&F, 26: TL 20-60 mm⁷⁹; Lower Penitencia Creek, footbridge at end of Abbott Avenue, leading to Cutner School, 12/Aug/81, L&F, 26: TL 22-61 mm⁸¹; Mission Creek, at Mission San Jose High School, 12/Aug/81, L&F, 3: TL 35-47 mm⁷⁴; Isabel Creek, at Mt. Hamilton Road (San Antonio Road, T7S, R3E, Sec 1), 13/Aug/81, L&F, 50: TL 15-32 mm⁷⁸; Arroyo Bayo Creek, 1.2 km E of USGS BM 1924 on San Antonio Road (T7S, R4E, Sec 5), 13/Aug/81, L&F, 2: TL 48-50 mm⁷⁷; Beauregard Creek, 0.2 km downstream from junction with Sulphur Springs Creek (T6S, R4E, Sec 36), 13/Aug/81, L&F, 15: TL 17-37 mm⁷⁶; Colorado Creek, at junction with Mines Road at mouth of Horsethief Canyon (T6S, R4E, Sec 2), 13/Aug/81, L&F, 3: TL 17-27 mm⁷⁵; Matadero Creek, at frontage road immediately below Bayshore Fwy, 18/Aug/81, L&F, 52: TL 23-43 mm¹³⁰; Matadero Creek, on Waverly Road, 2.5 blocks E on Oregon Avenue, 18/Aug/81, L&F, 100: TL 20-32 mm¹³¹; Adobe Creek, at frontage road on W side of Hwy 101, 18/Aug/81, L&F, 100: TL 17-37 mm¹²⁹; Stevens Creek, at Moffett Road (T6S, R2W, Sec 22), 19/Aug/81, L&F, 27: TL 13-24 mm¹²⁵; Hale Creek, at Fairway Drive on SE border of Los Altos Country Club golf course, 20/Aug/81, L&F, 75: TL 15-51 mm¹²⁸; Hale Creek, at Covington Road, 20/Aug/81, L&F, 2: TL 43 mm¹²⁷; Permanente Creek, at Charleston Blvd. (T6S, R2W, Sec 9), 20/Aug/81, L&F, 2000: TL 22-52 mm¹²⁶; Saratoga Creek, at Mission College Blvd. (T6S, R1W, Sec 21), 21/Aug/81, L&F, 150: TL 18-48 mm¹²³; Calabazas Creek, at frontage road along Bayshore Fwy (T6S, R2W, Sec 21), 21/Aug/81, L&F, 1000: TL 16-32 mm¹²⁴; Los Gatos Creek, at Lack Avenue crossing off Hwy 17, 25/Aug/81, L&F, 50: TL 20-37 mm¹²²; Guadalupe River, at West Virginia Avenue bridge, 26/Aug/81, L&F, 32: TL 12-31 mm¹¹⁴; Guadalupe River, at Willow Glen Way, 26/Aug/81, L&F, 350: TL 15-31 mm¹¹⁵;

Guadalupe River, at confluence of Canoas Creek, 26/Aug/81, L&F, 200: TL 12-57 mm¹¹⁶; Ross Creek, at Harwood Avenue (T8S, R1W, Sec 7), L&F, 25: TL 19-47 mm¹¹⁸; Guadalupe River near industrial parkway off Alviso Road between Trimble Road and Montague Expressway, 30/Aug/81, L&L, 25: TL 14-60 mm¹⁰⁶; Guadalupe River, 0.3 km S of Bayshore Fwy on Guadalupe Parkway, near San Jose Municipal Airport, 30/Aug/81, L&L, 8: TL 13-34 mm¹⁰⁷; Guadalupe River, at Seymoor Street, 30/Aug/81, L&L, 100: TL 15-37 mm¹¹⁰; Guadalupe River, immediately downstream from Interstate 280 crossing, 30/Aug/81, L&L, 28: TL 17-54 mm¹⁰⁸; Coyote Creek, at Balfour Road off Senter Road, 31/Aug/81, L&F, 10: TL 17-24 mm⁹⁶; Coyote Creek, at Agnews State Hospital (East), 31/Aug/81, L&F, 4: TL 20-39 mm⁸⁸; Coyote Creek, at Trimble Road crossing, 31/Aug/81, L&F, 25: TL 20-31 mm⁹²; Coyote Creek, junction of Grandbrook Road and Yerba Buena Way, 1/Sept/81, L&F, 52: TL 17-37 mm¹⁰⁰; Miguelita Creek, at junction of road to KXRX radio station, 1/Sept/81, L&F, 200: TL 24-57 mm⁸²; Babb Creek, at confluence with Silver Creek, 1/Sept/81, L&F, 250: TL 17-29 mm⁸³; Fisher Creek, at Bailey Avenue bridge, 5/Sept/81, L&F, 100: TL 25-62 mm¹²⁰; Canoas Creek, at Hillsdale Avenue, 5/Sept/81, L&F, 250: TL 25-70 mm¹¹⁹. SOLANO COUNTY: Green Valley Creek, 1 mile N of U.S. 40, 21/Dec/40, B.W. Walker (UMMZ 132867, 6: 20-28 mm); Green Valley Creek, at Interstate 80 bridge, 2/Oct/81, L&L, 20: TL 25-32 mm¹⁴. SONOMA COUNTY: *Petaluma Creek, 18/Jul/68, CDFG; *Schell Creek, at confluence with Arroyo Seco Creek, 24/Jun/76, CDFG, abundant; Schell Creek, at Hwy 12 bridge, 15/Sept/81, L&F, 250: TL 14-50 mm¹⁰; Petaluma River, 25 m upstream from Hardin Lane bridge, 16/Sept/81, L&F, 50: TL 16-36 mm⁹.

Menidia beryllina

Distributional Records. ALAMEDA COUNTY: Arroyo Valley Creek, two ponds lying immediately to the S of Shadow Cliffs Reservoir, Jul/78, CDFG⁸; Alameda Creek, below spillway opposite USGS gaging station, Niles Canyon (T4S, R1E, Sec 7), 1/Oct/81, L&F, 2: FL 75-82 mm⁹. CONTRA COSTA COUNTY: Walnut Creek, immediately downstream from Hwy 4 crossing, 5/Oct/80, L&L, 7: TL 83-108 mm⁴; Walnut Creek, 50 m upstream from junction with Pine Creek, 5/Oct/80, L&L, 3:

TL 83-89 mm⁵; Walnut Creek, at confluence of Grayson Creek, 12/Oct/80, L&L, 75: TL 102-152 mm³; Pinole Creek, 0.6 km downstream from AT + SF railroad bridge, 23/Jun/81, L&F, 199: FL 10-22 mm⁶; Arroyo Hambre Creek, at Berkeley Street, Martinez, 24/Aug/81, L&F, 12: FL 60-97 mm⁷. SANTA CLARA COUNTY: Los Gatos Creek, Campbell percolation ponds, 27/Dec/68 (SJSU)¹⁰; Los Gatos Creek, at Lack Avenue off Hwy 17, 25/Aug/81, L&F, 1: FL 85 mm¹¹. SOLANO COUNTY: Green Valley Creek, at ~~SPRR~~ bridge (T4N, R2W, Sec 7), 2/Oct/81, L&L, 30: FL 6-104 mm². SONOMA COUNTY: Petaluma River, Lakeville Hwy bridge, Petaluma, 19/Aug/80, CDFG, 6¹.

Gasterosteus aculeatus

Distributional Records. ALAMEDA COUNTY: Alameda Creek, 16/Sept/34, S. Seale (SU 7383, 4); San Lorenzo Creek, near Hayward High School, 1/Sept/52, M. Pitman (SU, 3)¹⁵²; Alameda Creek, ca. 100 yds below SPRR bridge, Niles, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS, Acc. 1955-X: 31, 1: adult)¹⁵⁸; *Palomares Creek, 18/Jun/60, CDFG, numerous: 1-2 in.; *Crow Creek, 16/Jun/60, CDFG; Creek tributary to Alameda Creek, Lowry Road and SPRR, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 2: SL 45-46 mm)¹⁵⁹; Alameda Creek, at bridge on Hesperian Blvd., N of Alvarado, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 13: SL 30-55 mm)¹⁶³; Bay Farm Island (CAS 13086, 6; in Hopkirk, 1973: 75); Berkeley Aquatic Park (Hopkirk, 1973: 75); Alameda Creek (lat. 37° 33', long. 122° 04'), 20,21/Jun/73 (Aceituno et al., 1973: 199, 1: FL 63 mm)¹⁶¹; Alameda Creek (lat. 37° 34', long. 122° 04'), 20,21/Jun/73 (Aceituno et al., 1973: 199, 1: FL 61 mm)¹⁶⁰; Crow Canyon Creek, E of 4821 Crow Canyon Road, Hayward, 8/Jul/75, CDFG (fish kill), 1000+: 1-2 in.; *San Lorenzo Creek, below Don Castro Dam to concrete channel, 4,5/Oct/75, CDFG; *Crow Creek, lower reaches, 5,6/Oct/75, CDFG; *San Leandro Creek, 12/Aug/75, CDFG; Cerrito Creek, at Adams Drive, 9/Jul/81, L&F, 5: TL 21-33 mm; Cerrito Creek, 50 m downstream from Adams Drive, 9/Jul/81, L&F, 300: TL 15-60 mm; Cerrito Creek, 75 m downstream from Adams Drive, 9/Jul/81, L&F, 52: TL 17-63 mm; Cerrito Creek, at Pierce Road bridge above Hwy 80, 9/Jul/81, L&F, 107: TL 20-64 mm¹³³; San Leandro Creek,

opposite Grover Cleveland Elementary School above Hwy 17, 22/Jul/81, L&F, 11: TL 20-35 mm¹⁵⁵; San Leandro Creek, 75 m downstream from MacArthur Blvd., 22/Jul/81, L&F, 150: TL 25-51 mm¹³⁶; San Leandro Creek, immediately downstream from MacArthur Blvd., 22/Jul/81, L&F, 19: TL 18-41 mm¹³⁷; San Leandro Creek, 250 m downstream from junction with MacArthur Blvd., 22/Jul/81, L&F, 21: TL 19-31 mm¹³⁸; San Leandro Creek, pool opposite Chabot Regional Park parking lot on south branch, below Chabot Dam, 22/Jul/81, L&F, 53: TL 20-41 mm¹³⁹; San Leandro Creek, 250 m upstream from Chabot Regional Park parking lot on south branch, below Chabot Dam, 22/Jul/81, L&F, 27: TL 24-37 mm¹⁴⁰; San Leandro Creek, 100 m upstream from bridge to entrance to Chabot Regional Park, north branch, below Chabot Dam, 22/Jul/81, L&F, 1: TL 27 mm; San Leandro Creek, 30 m below Chabot Dam spillway, 22/Jul/81, L&F, 5: TL 20-39 mm¹⁴²; Arroyo Viejo Creek, at Arroyo Viejo Recreational Center Oakland, 23/Jul/81, L&F, 100: TL 16-29 mm¹³⁴; San Lorenzo Creek, at 2nd Street bridge, Hayward, 23/Jul/81, L&F, 250: TL 17-38 mm¹⁴³; San Lorenzo Creek, 250 m upstream from 2nd Street bridge, Hayward, 23/Jul/81, L&F, 102: TL 18-40 mm¹⁴⁴; San Lorenzo Creek, 300 m upstream from 2nd Street bridge, Hayward, 23/Jul/81, L&F, 57: TL 16-37 mm¹⁴⁵; San Lorenzo Creek, 50 m downstream from confluence of Crow Creek, 24/Jul/81, L&F, 10: TL 21-39 mm¹⁴⁸; Crow Creek, 1 mile upstream from junction of Cull Canyon Road and Crow Canyon Road at 2nd crossing of Crow Creek Road, 25/Jul/81, L&L, 20: TL 13-42 mm¹⁵¹; San Lorenzo Creek, 100 m upstream from junction with Hwy 580, 25/Jul/81, L&L, 50: TL 15-40 mm¹⁵⁰; San Lorenzo Creek, at pool immediately below Cull Canyon Reservoir spillway, 25/Jul/81, L&L, 100: TL 16-49 mm¹⁴⁹; San Lorenzo Creek, 50 m upstream from B Street bridge, 25/Jul/81, L&L, 23: TL 19-38 mm¹⁴⁷; San Lorenzo Creek, 30 m downstream from B Street bridge, 25/Jul/81, L&L, 17: TL 18-43 mm¹⁴⁶; Arroyo las Positas Creek, 200 m downstream from confluence with Cayetano Creek (T3S, R2E, Sec 6), 26/Jul/81, L&L, 50: TL 17-28 mm¹⁵⁵; Arroyo las Positas Creek, 100 m upstream from confluence of Cayetano Creek, 26/Jul/81, L&L, 25: TL 17-32 mm¹⁵⁶; South San Ramon Creek, pool upstream from Hwy 580 crossing, 30/Jul/81, L&F, 500: TL 15-33 mm¹⁵³; Tassajara Creek, foot bridge at Tassajara Regional Park, 30/Jul/81, L&F, 50: TL 14-35 mm¹⁵⁴; Alameda Creek, opposite Sunol Regional Wilderness headquarters (T5S,

R2E, Sec 17), 6/Aug/81, L&F, 6: TL 15-30 mm¹⁵⁷; Alameda Creek, upstream from crossing of Alvarado-Niles Road and Dyer Street, 21/Sept/81, L&F, 50: TL 15-37 mm¹⁶². CONTRA COSTA COUNTY: Port Costa, 10/Jun/02, Port Costa Water Company (CAS 12482, 6: SL 33-36); San Pablo Creek, 6 miles below San Pablo Reservoir, 1/Dec/41, G. Murphy (SU 40836, 80); San Pablo Creek, at Orinda, 19/Nov/42, G. Murphy (SU 40837, 9)¹¹⁵; San Pablo Creek, at Orinda, 19/Dec/42, G. Murphy (CAS, Acc. 1964-XI: 3, 8); Bear Creek, tributary SE side of San Pablo Reservoir, 4.5 miles from Orinda junction, 1/May/43, G. Murphy (SU, 3)¹²⁷; San Ramon Creek, 1.8 miles above Walnut Creek (town), 3/Aug/45, W.I. Follett (CAS 41022, 320)⁸⁷; San Pablo Creek, 18/Apr/53, M.W. Brink (CAS, Acc. 1964-XI: 13, 7); *Bear Creek, mouth to 5 miles upstream from San Pablo Reservoir, 13/Sept/60, CDFG; Drainage ditch between SPRR tracks and Carlson Blvd., Richmond, 3/Jun/70, J. Conners (CAS, Acc. 1970+VI: 5, 1); Rodeo Creek, 0.25 mile below Hwy 80, near bridge on road used by Flood Control District, 14/Feb/74, CDFG, 1: 2.5 in.⁹⁵; Rodeo Creek, immediately downstream from Hwy 80 bridge, 14/Feb/74, CDFG, 2⁹⁶; Rodeo Creek, at flood control natural rock drop structure downstream from Hwy 80, 20/Feb/74, CDFG, numerous; *Rodeo Creek, at culvert-bridge entrance to Franklin Canyon Golf Club, 20/Mar/74, CDFG; *Rodeo Creek, at concrete drop structure in the Luzon area, 20/Mar/74, CDFG; San Pablo Creek, 0.2 mile downstream from Bear Creek Road bridge, 3/Jun/76, CDFG¹²⁴; *San Pablo Creek, above Orinda filtration plant, 3/Jun/76, CDFG, abundant; *Pinole Creek, downstream from bedrock falls below junction of Pinole Valley Road and Hampton Road, 4/Jun/76, CDFG, common; San Pablo Creek, immediately upstream from Orinda Filtration Plant, 4/Jun/76, CDFG, 17: FL 1.1-2.3 in.¹²³; San Pablo Creek, 1.5 miles downstream from Orinda Filtration Plant, 4/Jun/76, CDFG, 4: FL 0.7-0.9 in.¹²²; *Tice Creek, above Tice Valley Blvd. to lower culvert at Lilac Drive, 12/Jul/76, CDFG, abundant; *Walnut Creek, culvert having confluence with San Ramon Creek to mouth, 20,21/Jul/77, CDFG, abundant; *San Ramon Creek, headwaters to culvert having confluence with Walnut Creek, 26/Jul/77, CDFG, abundant; *Pine Creek, 28/Jul/77, CDFG, abundant; Walnut Creek, pool below drop structure immediately downstream from Bancroft Road crossing, Walnut Creek, 14/Jul/78, CDFG⁸⁵; Pinole Creek, 0.4 mile downstream from intersection of Pinole Valley Road, Alhambra Valley Road, and Hampton Road,

9/Nov/78, CDFG¹¹⁰; Pinole Creek, immediately downstream from Simas Avenue crossing, Pinole, 9/Nov/78, CDFG¹⁰⁸; Pinole Creek, immediately downstream from intersection of Pinole Valley Road and Castro Ranch Road, 9/Nov/78, CDFG¹¹¹; *Pinole Creek, downstream from the Castro Ranch Road junction, 6/Nov/79, CDFG; Pinole Creek, 1.6 miles E of the intersection of Castro Ranch Road and Alhambra Valley Road, 20/Nov/79, CDFG, 5: FL 1.6-2.0 in.¹¹⁴; Pinole Creek, upstream from undercrossing at Pinole Valley Road, N of Ellorhorst intersection, 20/Nov/79, CDFG, 10: FL 1.4-1.9 in.; Walnut Creek, immediately downstream from Hwy 4 bridge, 5/Oct/80, L&L, 12: TL 25-44 mm⁸¹; Walnut Creek, 50 m upstream from SPRR bridge at Walnut Creek Civic Center, 5/Oct/80, L&L, 8: TL 44-51 mm⁸⁶; Walnut Creek, 50 m upstream from confluence of Pine Creek, 5/Oct/80, L&L, 1: TL 13 mm⁸¹; San Ramon Creek, at junction of Camino Ramon Drive, S of Danville, 5/Oct/80, L&L, 100: TL 32-44 mm⁸⁸; San Ramon Creek, at junction of Sycamore Valley Road, 6/Oct/80, L&L, 100: TL 25-44 mm⁹⁰; Green Valley Creek, immediately downstream from junction with Diablo Road, 6/Oct/80, L&L, 10: TL 25-38 mm⁸⁹; Tice Creek, at junction with Coventry Court, 6/Oct/80, L&L, 30: TL 25-61 mm⁹¹; Grayson Creek, 50 m upstream from Hwy 24 crossing, 12/Oct/80, L&L, 6: TL 25-32 mm⁸²; Grayson Creek, at Pleasant Hill Road bridge, 12/Oct/80, L&L, 25: TL 25-28 mm⁸³; Las Trampas Creek, 50 m upstream from junction with Pleasant Hill Road, Lafayette, 12/Oct/80, L&L, 100: TL 25-51 mm⁹²; Lafayette Creek, at Lafayette Reservoir Filtration plant, 12/Oct/80, L&L, 12: TL 51-64 mm⁹³; Marsh Creek, 0.15 km E of USGS BM 485 on Marsh Creek Road, 22/May/81, L&L, 45: TL 27-52 mm⁷⁸; Rodeo Creek, 0.3 km downstream from Hwy 80, Rodeo, 18/Jun/81, L&F, 41: TL 17-50 mm⁹⁷; Rodeo Creek, 0.5 km upstream from Hwy 80 at pool immediately below 1st drop structure, 18/Jun/81, L&F, 5: TL 20-30 mm⁹⁸; Rodeo Creek, pool below drop structure 50 m downstream from junction with SFRR bridge, 18/Jun/81, L&F, 200: TL 20-35 mm⁹⁹; Rodeo Creek, pool immediately below SFRR bridge, 18/Jun/81, L&F, 67: TL 30-42 mm¹⁰⁰; Rodeo Creek, 75 m upstream from junction with SFRR bridge, 18/Jun/81, L&F, 2: TL 20 mm¹⁰¹; Rodeo Creek, 0.6 km downstream from Franklin Golf Course Clubhouse, 18/Jun/81, L&F, 3: TL 25-30 mm¹⁰²; Rodeo Creek, 100 m downstream from Franklin Canyon Clubhouse, 18/Jun/81, L&F, 107: TL 20-45 mm¹⁰³; Pinole Creek, 0.6 km downstream from AT + SF railroad bridge,

23/Jun/81, L&F, 230: TL 15-55 mm¹⁰⁵; Pinole Creek, 100 m upstream from culvert under San Pablo Avenue, 23/Jun/81, L&F, 500: TL 12-60 mm; Pinole Creek, 200 m downstream from junction of Interstate 80, 23/Jun/81, L&F, 150: TL 20-41 mm¹⁰⁶; Pinole Creek, 200 m upstream from junction of Interstate 80, 23/Jun/81, L&F, 51: TL 14-44 mm¹⁰⁷; Pinole Creek, junction with Pinole Valley Road immediately upstream from Ellorhorst School, 23/Jun/81, L&F, 100: TL 15-35 mm¹⁰⁹; Pinole Creek, immediately downstream from junction of Pinole Valley and Hampton Roads, 23,24/Jun/81, L&F, 35: TL 23-32 mm¹¹²; Garrity Creek, 0.25 mile upstream from SPRR birdge (T2N, R4W, Sec 20), 7/Jul/81, L&F, 111: TL 16-41 mm; Garrity Creek, 25 m upstream from AT + SF railroad crossing (T2N, R4W, Sec 20), 7/Jul/81, L&F, 16: TL 30-65 mm¹³⁰; Wildcat Creek, upstream from 23rd Street bridge, Richmond, 8/Jul/81, L&F, 32: TL 25-36 mm¹³¹; Wildcat Creek, immediately upstream from Church Street bridge, San Pablo, 8/Jul/81, L&F, 27: TL 18-30 mm; Wildcat Creek, 100 m upstream from Church Street bridge, San Pablo, 8/Jul/81, L&F, 250: TL 20-55 mm; Wildcat Creek, at junction with Vale Road (USGS gaging station), 8/Jun/81, L&F, 79: TL 15-45 mm¹³²; San Pablo Creek, 25 m upstream from junction with Brookwood Road, Orinda (T1S, R3W, Sec 3), 11/Jul/81, L&F, 200: TL 11-78 mm¹¹⁶; San Pablo Creek, immediately downstream from junction with Brookwood Road, Orinda, 11/Jul/81, L&F, 75: TL 11-80 mm¹¹⁷; San Pablo Creek, west branch, 20 m upstream from confluence with south branch, Orinda (T1S, R3W, Sec 3), 11/Jul/81, L&F, 21: TL 10-70 mm¹¹⁸; San Pablo Creek, 100 m downstream from junction with Santa Maria Way, Orinda Village, 11/Jul/81, L&F, 5000: TL 12-85 mm¹¹⁹; San Pablo Creek, 0.7 km downstream from Orinda Crossroads, Orinda Village, 11/Jul/81, L&F, 253: TL 12-60 mm¹²⁰; San Pablo Creek, 25 m downstream from junction with Orinda Way, 12/Jul/81, L&F, 6: TL 13-50 mm; San Pablo Creek, at Miner Road bridge, 12/Jul/81, L&F, 50: TL 14-48 mm¹²¹; Lauterwasser Creek, at Bien Venida bridge, 12/Jul/81, L&F, 61: TL 13-35 mm¹²⁵; Lauterwasser Creek, at Lombardy Road, 12/Jul/81, L&F, 15: TL 12-22 mm¹²⁶; San Pablo Creek, 30 m downstream from junction with Castro Ranch Road, El Sobrante, 12/Jul/81, L&F, 77: TL 15-52 mm¹²⁸; San Pablo Creek, 20 m upstream from junction with Valley View Road, El Sobrante, 12/Jul/81, L&F, 37: TL 13-55 mm; San Pablo Creek, downstream from junction with Appian Way, 13/Jul/81, L&F, 10: TL 20-56 mm; San

Pablo Creek, opposite Rancho School, El Sobrante, 13/Jul/81, L&F, 200: TL 12-60 mm; San Pablo Creek, 30 m upstream from bridge to St. Joseph Cemetery, San Pablo, 13/Jul/81, L&F, 155: TL 15-60 mm; San Pablo Creek, 100 m downstream from junction with San Pablo Avenue, 13/Jul/81, L&F, 62: TL 11-51 mm; San Pablo Creek, 15 m downstream from junction with 13th Street, 13/Jul/81, L&F, 102: TL 12-62 mm; San Pablo Creek, at SPRR bridge, 13/Jul/81, L&F, 53: TL 12-45 mm; San Pablo Creek, 30 m upstream from junction with 3rd Street, 13/Jul/81, L&F, 54: TL 10-56 mm; Pinole Creek, 0.25 mile downstream from junction with Pinole Valley and Hampton Roads, 4/Aug/81, L&F, 11: TL 15-32 mm¹¹³; Arroyo Hambre Creek, at Berkeley Street, Martinez, 24/Aug/81, L&F, 37: TL 18-45 mm⁹⁴; Mt. Diablo Creek, pool upstream from Kirker Pass Road bridge (T1N, R1W, Sec 10), 21/Sept/81, L&F, 35: TL 15-37 mm⁷⁹; Mt. Diablo Creek, upstream from Port Chicago Hwy bridge, 21/Sept/81, L&F, 15: TL 15-42 mm⁸⁰. MARIN COUNTY: San Anselmo Creek (Fry, 1936: 68); Miller Creek, at bridge 27-04 on Hwy 101, 19/Jul/45, D. Simpson (CAS 12991, 175: half-grown)²³; Arroyo de San Jose, at bridge 27-03 on Hwy 101, 100 yds S of Ignacio RR station, 19/Jul/45, D. Simpson (CAS 12994, 236)²⁴; Novato Creek, at bridge 27-01 on Hwy 101, 19/Jul/45, D. Simpson (CAS 12997, 132: TL 16-30 mm)²⁷; *San Anselmo Creek, downstream section, 26/Jul/59, CDFG; Corte Madera Creek, at Lagunitas Road bridge, 1/Nov/63, SFSU, 38¹; Corte Madera Creek, between Ross and San Anselmo, 15/May/65, SFSU, 63²; Corte Madera Creek, bridge at Ross, 9/Oct/67, SFSU, 410: 15-51 mm³; Corte Madera Creek, at Ross, 7/Oct/68, SFSU, 1219: 17-44 mm⁴; Corte Madera Creek, bridge at Ross firehouse, 17/Oct/69, SFSU, 179: SL 18-43 mm⁵; Corte Madera Creek, Lagunitas Road bridge in Ross, 27/Sept/71, SFSU, 790: 11-56.5 mm⁶; Corte Madera Creek, at bridge near fire station, Ross, 20/Sept/72, SFSU, several hundred⁷; Corte Madera Creek, bridge near Ross firehouse off Sir Francis Drake Blvd., 24/Sept/73, SFSU, 854+/-⁸; Corte Madera Creek, at Ross, vicinity of bridge over creek adjacent to Ross fire station, 16/Oct/74, SFSU, 173: 21-45 mm⁹; *Stemple Creek (Estero de San Antonio), 14/Jul/76, CDFG; San Antonio Creek, at junction with Chileno Valley Road (T4N, R8W, Sec 11), 16/Sept/81, L&F, 35: TL 14-25 mm³³; San Antonio Creek, at junction of Petaluma Cutover near Union School (T4N, R7W, Sec 17), 16/Sept/81, L&F, 3: TL 35-62 mm³⁴; San Antonio Creek, 0.25 mile upstream from Hwy 101 bridge

(T4N, R7W, Sec 23), L&F, 2: TL 21-33 mm³⁵; Novato Creek, 100 m downstream from Novato Reservoir spillway, 16/Sept/81, L&F, 250: TL 17-67 mm³¹; Novato Creek, at junction with Sutro Avenue, 16/Sept/81, L&F, 250: TL 15-50 mm³⁰; Novato Creek, at junction with 7th Street, 16/Sept/81, L&F, 57: TL 16-61 mm²⁹; Bowman Canyon Creek, at Hicks Valley Road bridge (Novato Blvd.), 16/Sept/81, L&F, 55: TL 15-43 mm³²; Miller Creek, 50 m upstream on Lucas Valley Road from junction with Sequeira Road, 17/Sept/81, L&F, 100: TL 16-17 mm²⁰; Miller Creek, at Galinas Road, 17/Sept/81, L&F, 75: TL 15-52 mm²¹; Miller Creek, at St. Vincent Drive, 17/Sept/81, L&F, 25: TL 15-42 mm²²; Arroyo de San Jose, Alameda del Prado, 17/Sept/81, L&F, 100: TL 14-38 mm²⁵; Arroyo de San Jose Creek, at Enfrente Blvd., 17/Sept/81, L&F, 75: TL 17-30 mm²⁶; Warner Creek, at Diablo Road, 17/Sept/81, L&F, 100: TL 15-40 mm²⁸; Fairfax Creek, at Marin Road, 18/Sept/81, L&F, 29: TL 15-36 mm¹⁸; Fairfax Creek, on Olema Road, 20 m downstream from junction with Alamitos Way, 18/Sept/81, L&F, 5: TL 16-26 mm¹⁹; Sleepy Hollow Creek, upstream from Butterfield Drive bridge, 18/Sept/81, L&F, 50: TL 13-51 mm¹⁷; Corte Madera Creek, downstream from junction with Madrone Drive, 18/Sept/81, L&F, 28: TL 16-36 mm¹¹; Corte Madera Creek, at Lagunitas Road bridge, 18/Sept/81, L&F, 30: TL 18-39 mm¹⁰; Unnamed creek through San Rafael along 1st Street, between E and D Streets, 18/Sept/81, L&F, 150: TL 17-47 mm¹²; Old Mill Creek, at Locust Road, 18/Sept/81, L&F, 75: TL 16-58 mm¹⁵; Unnamed creek through Larkspur at junction with Diane Lane, 18/Sept/81, L&F, 25: TL 16-40 mm¹⁴; Coyote Creek, on Tennessee Valley Road at GGNRA trail head, 19/Sept/81, L&F, 250: TL 17-29 mm¹⁶; Unnamed creek south of Pt. San Pedro at junction with Castlewood Drive, 19/Sept/81, L&F, 32: TL 17-47 mm¹³. NAPA COUNTY: Napa River, Calistoga and Rutherford, as Gasterostus cataphractus (Snyder, 1908: 184)^{46,56}; Conn Creek, as Gasterosteus cataphractus (Snyder, 1908: 184); Napa River, 2 miles below Calistoga, 1/Aug/43, G. Murphy (SU 40833, 16)⁴⁷; *Chiles Creek, in canyon above mouth of Moore Creek, 27/Jul/45, CDFG, 2: juveniles; Conn Creek, 0.25 mile above dam under soldiers home, tributary to Napa River, 31/Aug/58, E.W. Kirschbaum, T. Boud, and D. Rentz (CAS, Acc. 1958-VIII: 9, 10); Napa River, Napa, 30/May/63, J.D. Hopkirk, J. Shimizu, and A. Ota (CAS 23274, 2: SL 36-52 mm)⁶⁵; Napa River, Napa, 26/May/65, J.D. Hopkirk, J. Shimizu, and A. Ota (CAS, Acc.

1966-VI: 20, 8: SL 24.8-34.3 mm)⁶⁶; Tulacay Creek, at Calif. 29 bridge on Imola Avenue (West), Napa, 22/Apr/66, J.D. Hopkirk and A.M. Kuris (CAS, Acc. 1966-VI: 20, 1)⁶⁷; *Carneros Creek, 26/May/66, CDFG; Huichica Creek, lower 5.25 miles, 27/May/66, CDFG⁴³; *Brown's Valley Creek, 29/Jun/66, CDFG; *Hinman Creek, 600 yds E of Hwy 29 bridge to confluence with Napa River, Napa, 15/Jun/67, CDFG (fish kill), 100: 0.8-2.0 in.; *Bell Canyon Creek, Bell Canyon Dam to mouth, 20/Jun/69, CDFG; Bell Canyon Creek, one mile downstream from Bell Canyon Dam within NE $\frac{1}{4}$ of SW $\frac{1}{4}$ of Sec 13, T8N, R6W, 18/Jul/69, CDFG, 9: FL 1-2 in.⁴⁹; Bell Canyon Creek, 100 ft upstream from confluence with south fork of Bell Canyon Creek, 18/Jul/69, CDFG⁵⁰; Napa River, Yountville Cross Road, 28/Jul/69, CDFG⁵⁸; Napa River, Hwy 128 bridge, 29/Jul/69, CDFG⁵⁷; Napa River, Zinfandel Lane bridge, 29/Jul/69, CDFG⁵⁵; Napa River, Pope Street bridge, 31/Jul/69, CDFG⁵²; Napa River, Berry Avenue bridge, 8/Aug/69, CDFG; *Garnett Creek, 1.5 miles upstream from Hwy 29 bridge, 16/Jun/70, CDFG; Suisun Creek, off Gordon Valley Road, just below Lake Curry, 10/Aug/72, P.B. Moyle (UCDPM, 72-12, 100+)⁷¹; Napa River, Yountville Cross Road, 20/Oct/72, P.B. Moyle (UCDPM, 72-23, 2)⁵⁹; Sarco Creek, along Hwy 121 near Napa (T6N, R3W, Sec 13), 20/Oct/72, P.B. Moyle (UCDPM, 72-22, 3)⁶⁰; *Suscol Creek, lower section, 8,9/May/73, CDFG; *Bell Canyon Creek, Bell Canyon Dam to mouth, 17/Jul/75, CDFG; *Redwood Creek, mouth to 1 mile upstream, 13,14/Apr/77, CDFG, numerous; *Dry Creek, 13,14/Jun/77, CDFG; Sulphur Creek, 1st Pope Street crossing above Silverado Trail, 23/May/80, CDFG, 4⁵¹; Garnett Creek, at Grant Street bridge, 9/Sept/81, L&F, 7: TL 28-42 mm⁴⁵; Napa River, at Duna-weal Lane bridge, 9/Sept/81, L&F, 4: TL 37-52 mm⁴⁸; Redwood Creek, on Redwood Road 0.25 mile downstream from junction with Brown's Valley Road, 10/Sept/81, L&F, 13: TL 27-50 mm⁶²; Conn Creek, at milepost 8.07 E on Hwy 128, 10/Sept/81, L&F, 16: TL 17-30 mm⁵³; Napa Creek, at junction with Jefferson Street, Napa, 12/Sept/81, L&F, 37: TL 21-43 mm⁶⁴; Brown's Valley Creek, at Buhman Avenue bridge, 12/Sept/81, L&F, 52: TL 21-57 mm⁶³; Sarco Creek, upstream from junction of Frontage road along Hwy 12 (T5N, R4W, Sec 35), 12/Sept/81, L&F, 7: TL 33-105 mm⁶⁹; Tulacay Creek, 50 m upstream from Suscol Avenue bridge, 12/Sept/81, L&F, 232: TL 30-67 mm⁶⁸; Huichica Creek, below concrete barrier immediately downstream from Hwy 12, 14/Sept/81, L&F, 7: TL 42-63 mm⁴⁴; American Canyon Creek,

across from trailer park at American Canyon Road bridge (T4N, R4W, Sec 25), 19/Sept/81, L&F, 25: TL 18-34 mm⁷⁰. SAN FRANCISCO COUNTY: San Francisco, as Gasterosteus plebius (Girard, 1858: 86); Rivers from San Francisco to Alaska, as Gasterosteus aculeatus cataphractus (Jordan, 1881: 69). SAN MATEO COUNTY: San Francisquito Creek (Snyder, 1905: 337); [Redwood Creek?], "Redwood City," 12/May/40, B. Halstead (CAS 7514, 2: SL 27-29 mm); San Francisquito Creek, diversion channel leading to Lagunita Lake on Stanford University property, 20/May/66, CDFG; *San Francisquito Creek, upstream from Junipero Blvd., 1,2,5/Jul/76, CDFG; San Francisquito Creek, 1.5 miles above Junipero Serra Fwy 280, 13/Jul/76, CDFG, abundant; San Francisquito Creek, 75 yds below Junipero Serra Fwy 280, 13/Jul/76, CDFG, abundant; San Francisquito Creek, 75 yds below Junipero Serra Fwy 280, 13/Jul/76, CDFG, abundant; San Francisquito Creek, Lake Lagunita diversion dam, 13/Jul/76, CDFG, abundant²⁰⁰; San Francisquito Creek, at Junipero Serra Blvd. crossing, 13/Jul/76, CDFG, abundant²⁰¹; Los Trancos Creek, upstream from Piers Lane crossing near confluence with San Francisquito Creek, 14/Jul/76, CDFG, abundant¹⁹⁶; *Los Trancos Creek, downstream from Felt Lake diversion, 7/Aug/76, CDFG, abundant; Redwood Creek, north branch, at Middlefield Road and SPRR bridge, 15/Aug/81, L&F, 50: TL 25-60 mm²⁰⁵; San Francisquito Creek, 100 m upstream from Hwy 101 bridge, 15/Aug/81, L&F, 27: TL 26-44 mm²⁰⁴; Redwood Creek, north branch, at James Avenue, Redwood City, 15/Aug/81, L&F, 10: TL 27-57 mm²⁰⁶; Los Trancos Creek, 0.25 mile upstream from Fwy 280, 16/Aug/81, L&F, 6: TL 18-27 mm¹⁹⁷; San Francisquito Creek, 0.4 km downstream from Willow Road bridge, 16/Aug/81, L&F, 11: TL 18-22 mm¹⁹⁹; San Francisquito Creek, 20 m downstream from Willow Road bridge, 16/Aug/81, L&F, 2: TL 17-23 mm¹⁹⁸; San Francisquito Creek, at junction with 1st right off Alpine Road near Hwy 280, 16/Aug/81, L&F, 2: TL 18-20 mm¹⁹³; San Mateo Creek, at Sierra Drive, San Mateo, 17/Aug/81, L&F, 52: TL 21-38 mm²¹³; San Mateo Creek, 1 km downstream from junction of Crystal Springs Road and Polhemus Road, 17/Aug/81, L&F, 60: TL 16-33 mm²¹²; San Mateo Creek, at junction of Crystal Springs Road and Polhemus Road near BM 125, 17/Aug/81, L&F, 250: TL 20-41 mm; San Mateo Creek, 0.6 km upstream from junction of Crystal Springs Road and Polhemus Road, 17/Aug/81, L&F, 37: TL 22-42 mm²¹¹; Belmont Creek, at Alexander Sanitarium, 17/Aug/81, L&F, 250:

TL 21-42 mm²⁰⁹; Belmont Creek, immediately downstream from Industrial Road bridge (T5S, R4W, Sec 2), 17/Aug/81, L&F, 150: TL 16-31 mm²⁰⁸; Sanchez Creek, SPRR bridge, San Mateo, 23/Aug/81, L&F, 20: TL 19-27 mm²¹⁴; Laurel Creek, at Otay Avenue, 23/Aug/81, L&F, 65: TL 15-37 mm²¹⁰; Cordilleras Creek, at Grant-Industrial Road, 23/Aug/81, L&F, 50: TL 17-40 mm²¹⁷. SANTA CLARA COUNTY: San Jose, as Gasterosteus plebeius (Girard, 1858 :86); Adobe Creek, 1896-1898?, W.W. Thoburn and Johnson (SU 4444, 50); Coyote, Guadalupe, Campbell, Stevens, San Antonio, Arroyo Hondo, and Isabel Creeks (Snyder, 1905: 337); Guadalupe Creek, San Jose, 30/Sept/22, C.L. Hubbs (UMMZ 192611, 1: 16 mm)¹⁸³; Coyote Creek, at bridge opposite Milpitas, 16/Oct/32, W.I. Follett and party (CAS)¹⁷⁸; Lower Coyote Creek (Fry, 1936: 67); Guadalupe Creek (Fry, 1936: 67); Calero Reservoir, on tributary of Alamitos Creek, tributary to Guadalupe River, 13/Sept/37, L. Shapovalov (CAS, Acc. 1952-X: 30, 1: SL 37 mm)¹⁸³; San Francisquito Creek, El Camino Real and SPRR bridge, Palo Alto, 13/May/38, L. Shapovalov (SU 19258, 35)²⁰²; Francisquito [San Francisquito] Creek, Palo Alto, 13/Jun/39, Kenton and D. Grant (SU, 5)²⁰³; Coyote Creek, below hwy bridge opposite Milpitas (lat. 37°, 25', 20"N, long. 121°, 55', 30"W), 31/Oct/41, W.I. Follett (CAS 40261, 1)¹⁷⁹; Coyote Creek, opposite Milpitas, 11/May/44, W.I. Follett (CAS, 1)¹⁸⁰; Coyote Creek, at Calif. Hwy 9, opposite Milpitas, 2/Aug/44, W.I. Follett (CAS 40572, 8)¹⁸¹; Coyote Creek, 1945, D. Simpson (in Aceituno et al., 1976: 205); Calero Reservoir, outlet at McKean Road crossing (T8S, R2E, Sec 31), 24/Jul/53, T.J. Merkel (CAS 20979, 5)¹⁸²; Coyote Creek, at U.S. Hwy 101 X-ing (T7S, R2E, Sec 31), 24/Jul/53, T.J. Merkel (CAS 20981, 2)¹⁶⁸; Coyote Creek drainage, May/55, (SJSU, CD-5); Coyote Creek, drainage, 1956 (SJSU, CD-13); San Francisquito Creek drainage, Apr/56 (SJSU, SF-10, 11); San Francisquito Creek drainage, Jan/57 (SJSU, SF-12); Coyote Creek, between William Street and Tully Road, 3/Mar/60 (SJSU, CD-17)¹⁷⁰; Coyote Creek drainage, 5/Nov/64 (SJSU, CD-29); Guadalupe Creek, 31/Mar/66 (SJSU, GD-12); Coyote Creek, 7/Mar/72, R.L. Hassur (SJSU); Coyote Creek, 1972, W.I. Follett (Aceituno et al., 1976: 205); Coyote Creek (lat. 37°, 25', long. 122°, 55'), 21/Jun/73 (Aceituno et al., 1976: 203, 3: FL 28-31 mm)¹⁷⁶; Coyote Creek (lat. 37°, 13', long. 121°, 45'), 21/Jun/73 (Aceituno et al., 1976: 203, 8: FL 21-44 mm)¹⁶⁴; *Stevens Creek, below Hwy 101,

25,28/Jun/75, CDFG; *Berryessa Creek, 0.75 mile upstream from mouth, 27/Jun/75, CDFG; *Upper Silver Creek, middle reach adjacent to Silver Creek Road downstream to concrete diversion channel, 19/Aug/75, CDFG; Coyote Creek, 100 yds below Berryessa Road, 23/Sept/75, CDFG, numerous¹⁷⁴; Coyote Creek, 100 yds upstream from Oakland Road bridge near San Jose Municipal Golf Course, 23/Sept/75, CDFG, numerous¹⁷⁵; *Stevens Creek, below Hwy 101 bridge, 29/Dec/75, CDFG; *Coyote Creek, downstream from confluence of Upper Penitencia Creek, 19/May/77, CDFG; Stevens Creek, 150 yds S of Hwy 101 to approximately 0.5 to 0.75 mile downstream, 8/May/78, CDFG (fish kill), 250-300: 1-2 in.¹⁸⁷; Coyote Creek, above percolation ponds, 2 km below Anderson Reservoir (Scoppettone and Smith, 1978: 63)¹⁵⁹; Coyote Creek, Riverside Golf Course Road (Scoppettone and Smith, 1978: 63)¹⁶¹; Coyote Creek, upstream from Metcalf Road (Scoppettone and Smith, 1978: 63)¹⁶⁵; Coyote Creek, Tennant Road (Scoppettone and Smith, 1978: 63)¹⁶⁷; Coyote Creek, mouth of Penitencia Creek (Scoppettone and Smith, 1978: 63)¹⁷³; Silver Creek, near Capitol Expressway (Scoppettone and Smith, 1978: 63)¹⁶⁹; Matadero Creek, vicinity of V.A. Hospital to 0.5 mile downstream, 10/Jun/80, CDFG (fish kill), approximately 100: 0.75-1.25 in.; Upper Penitencia Creek, 0.6 km upstream from junction of Dutard Creek near BM 332, 11/Aug/81, L&F, 12: TL 23-40 mm¹⁵⁸; Matadero Creek, junction of Old Page Mill Road and Page Mill Road, 18/Aug/81, L&F, 250: TL 21-43 mm¹⁹⁵; Matadero Creek, immediately downstream from Foothill Expressway bridge, 18/Aug/81, L&F, 200: TL 19-61 mm¹⁹²; Matadero Creek, downstream from junction with frontage road immediately below Bayshore Fwy., 18/Aug/81, L&F, 10: TL 20-33 mm¹⁹¹; Deer Creek, at junction with Arastradero Road below Fwy 280, 18/Aug/81, L&F, 27: TL 22-47 mm¹⁹⁴; Adobe Creek, at frontage road on west side of Hwy 101, 18/Aug/81, L&F, 23: TL 20-47 mm¹⁹⁰; Stevens Creek, 0.5 mile downstream from junction with Moffett Road (T6S, R2W, Sec 22), 19/Aug/81, L&F, 15: TL 17-23 mm¹⁸⁸; Stevens Creek, at Homestead Road (T7S, R2W, Sec 10), 19/Aug/81, L&F, 200: TL 16-55 mm¹⁸⁶; Stevens Creek, 25 m downstream from Stevens Creek Road bridge (T7S, R2W, Sec 15), 19/Aug/81, L&F, 26: TL 21-55 mm¹⁸⁴; Stevens Creek, 25 m upstream from Stevens Creek Road bridge (T7S, R2W, Sec 15), 19/Aug/81, L&F, 36: TL 16-36 mm¹⁸⁵; Hale Creek, at Covington Road (T6S, R2W, Sec 32), 20/Aug/81, L&F, 50: TL 15-42 mm¹⁸⁹; Coyote Creek, at Hwy 237 bridge

opposite Milpitas, 31/Aug/81, L&F, 2: TL 37-40 mm¹⁷⁷; Silver Creek, 1 km upstream from Capitol Expressway on Silver Creek Road, 1/Sept/81, L&F, 205: TL 24-51 mm¹⁷¹; Babb Creek, at junction with Silver Creek, 1/Sept/81, L&F, 4: TL 20-34 mm¹⁷²; Coyote Creek, at Malguerra Avenue (Santa Clara County Boys Ranch), 3/Sept/81, L&F, 10: TL 17-32 mm; Coyote Creek, 2 km upstream from large gravel pits opposite San Bruno Avenue, 3/Sept/81, L&F, 26: TL 21-61 mm¹⁶⁰; Coyote Creek, 25 m upstream from junction with Metcalf Road, 3/Sept/81, L&F, 10: TL 19-27 mm¹⁶⁶; Fisher Creek, at Bailey Avenue bridge, 5/Sept/81, L&F, 27: TL 35-60 mm¹⁶²; Metcalf Canyon Creek, 20 m upstream from confluence with irrigation canal, 5/Sept/81, L&F, 3: TL 25-42 mm¹⁶³. SOLANO COUNTY: Green Valley Creek, at Interstate 80 bridge (T4N, R3W, Sec 1), 2/Oct/81, L&L, 15: TL 27-46 mm⁷⁴; Green Valley Creek, upstream from Mason Road bridge (T5N, 3E, Sec 35), 2/Oct/81, L&L, 33: TL 25-45 mm⁷³; Green Valley Creek, at SPRR bridge (T4N, R2W, Sec 7), 2/Oct/81, L&L, 17: TL 25-40 mm⁷⁵; Suisun Creek, downstream from Cordelia Road bridge, 2/Oct/81, L&L, 5: TL 18-24 mm⁷⁷; Suisun Creek, at Suisun Valley Road bridge, immediately before Twin Sisters Gun Club turnoff (T5N, R2W, Sec 7), 2/Oct/81, L&L, 100: TL 18-35 mm⁷⁶; Suisun Creek, at Lakeside Road gate to Lake Curry, 2/Oct/81, L&L, 15: TL 20-30 mm⁷². SONOMA COUNTY: Petaluma (Girard, 1857: 537)³⁶; Petaluma, as Gasterosteus plebeius (Girard, 1858: 86); Petaluma Creek, at Penn Grive, 6/Nov/43, G. Murphy (SU 40839, 13)³⁹; *Willow Brook Creek, 17/Jul/68, CDFG; *Lichau Creek, lower section, 17,18/Jul/68, CDFG; *Petaluma Creek, 18/Jul/68, CDFG; *Arroyo Seco Creek, 15/Jun/76, CDFG; Sonoma Creek, at West Watmaugh Road, 15/Sept/81, L&F, 25: TL 15-37 mm⁴⁰; Nathanson Creek, at E. Napa Street, 15/Sept/81, L&F, 13: TL 27-62 mm⁴¹; Schell Creek, at Hwy 12 bridge, 15/Sept/81, L&F, 150: TL 15-61 mm⁴²; Petaluma River, at Penngrove City Park, 15/Sept/81, L&F, 3: TL 21-57 mm³⁸; Petaluma River, 25 m upstream from Hardin Lane bridge, 16/Sept/81, L&F, 30: TL 15-56 mm³⁷.

Cottus asper

Distributional Records. ALAMEDA COUNTY: Alameda Creek (Snyder, 1905: 337); Alameda Creek, immediately below dam in Niles Canyon, 24/Jul/27, W.I. Follett

(CAS, Acc. 1927, several adults)⁴¹; Alameda Creek, immediately below dam in Niles Canyon, 31/Jul/27, W.I. Follett (CAS, Acc. 1927, 1: adult)⁴²; Alameda Creek, 15/Oct/34, A. Seale (SU 6840, 2); Alameda Creek, 19/May/38, L. Shapovalov (CAS, Acc. 1952-X: 30, 2: SL 64-66 mm); Alameda Creek, between Niles and bridge just E of Sunol, 25/Feb/39, R.R. Miller and G. Murphy (UMMZ 133182, 2: 53-72 mm); Alameda Creek, at WPRR bridge below Niles, 14/Oct/55, W.I. Follett and G.M. Peckham (CAS 26159, 16: young to large young)⁵⁴; Alameda Creek, gravel pit pond (lat. 37°, 34', long. 121°, 59'), 14/Oct/55, W.I. Follett and G.M. Peckham (CAS, several large young)⁴⁷; Alameda Creek, 0.2 mile above WPRR bridge below Niles, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS 26165, 3)⁴⁸; Alameda Creek, ca. 100 yds below SPRR bridge, Niles, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS, Acc. 1955-X: 31, several half-grown)⁵³; Alameda Creek, pools opposite Calif. Nursery Co., 25/Mar/57, W.I. Follett and G.M. Peckham (CAS 26725, 1: adult)⁵⁰; Alameda Creek, pool at Niles Sand and Gravel Co., 22/Apr/57, W.I. Follett and G.M. Peckham (CAS 26730, 1: small adult)⁴⁹; Alameda Creek, 0.2 mile above Calif. Hwy 17, just above bridge of new fwy, 21/Jul/57, W.I. Follett and G.M. Peckham (CAS 26289, 3: young to small adult)⁵⁶; Alameda Creek, at Niles, 22/Feb/66, J.D. Hopkirk and party (CAS 24714, 1: SL 80 mm)⁵¹; Arroyo de la Laguna Creek, 3 miles N of Sunol, 22/Feb/66, J.D. Hopkirk and party (CAS 24715, 4: SL 47-85 mm)³⁷; Alameda Creek (lat. 37°, 35', long. 121°, 59'), 20,21/Jun/73 (Aceituno et al., 1976: 199, 10: FL 34-100 mm)⁵²; Alameda Creek (lat. 37°, 35', long. 121°, 55'), 20,21/Jun/73 (Aceituno et al., 1976: 199, 2: FL 80-90 mm)⁴⁴; Arroyo de la Laguna Creek, confluence with Alameda Creek, 4/Feb/76, CDFG, 3: FL 69-93 mm³⁹; Arroyo de la Laguna Creek, near mouth (Scoppettone and Smith, 1978: 64)⁴⁰; Arroyo de la Laguna Creek, 150 yds upstream from confluence with Alameda Creek, 4/Feb/76, CDFG, 4: FL 66-91 mm³⁸; San Leandro Creek, south branch, 250 m upstream from Chabot Regional Park parking lot below dam, 22/Jun/81, L&F, 1: TL 87 mm³⁶; San Leandro Creek, immediately downstream from MacArthur Blvd. crossing, 22/Jul/81, L&F, 2: TL 51-68 mm³⁵; Alameda Creek, pools below spillway opposite USGS gaging station, Niles Canyon (T4S, R1E, Sec 7), 1/Oct/81, L&F, 3: TL 97-117 mm⁴³; Alameda Creek, opposite Kaiser aggregate quarry (T4S, R1W, Sec 12), 1/Oct/81, L&F, 1: TL 82 mm; Alameda Creek, at 1st railroad cross-

ing above Niles (T4S, R1W, Sec 15), 1/Oct/81, L&F, 1: TL 73 mm⁴⁶. CONTRA COSTA COUNTY: Walnut Creek, immediately downstream from Hwy 4 bridge, 5/Oct/80, L&L, 4: TL 25-44 mm³²; Walnut Creek, at confluence with Grayson Creek, 12/Oct/80, L&L, 1: TL 38 mm³¹; Pinole Creek, 100 m upstream from culvert under San Pablo Avenue, 23/Jun/81, L&F, 1: TL 98 mm³³; Moraga Creek, 25 m upstream from 1st bridge at Valle Vista Staging Area along Canyon Road (T1S, R2W, Sec 19), 5/Aug/81, L&F, 19: TL 27-48 mm³⁴. MARIN COUNTY: Miller Creek, at bridge 27-04 on Hwy 101, 19/Jul/45, D. Simpson (CAS 12992, 1)¹¹; Corte Madera Creek, at Lagunitas Road bridge, just west of Ross City Hall (37°, 51', 45" N, 122°, 32', 35" W), SFSU, 36¹; Corte Madera Creek, between Ross and San Anselmo, 15/May/65, SFSU, 1, also CAS, 2: SL 30-37 mm²; Corte Madera Creek, bridge at Ross, 9/Oct/67, SFSU, 4: 30-80 mm³; Corte Madera Creek, at Ross, 7/Oct/68, SFSU, 4: 40-73 mm⁴; Corte Madera Creek, Lagunitas Road bridge in Ross, 27/Sept/71, SFSU, 1: 88 mm⁵; Corte Madera Creek, bridge near Ross firehouse, off Sir Francis Drake Blvd., 24/Sept/73, SFSU, 1⁶; Corte Madera Creek, 0.5 mile above Ross, (CAS, 2: in Hopkirk, 1973: 93)⁷; Novato Creek, at 7th Street bridge, 16/Sept/81, L&F, 2: TL 110-132 mm¹³; Warner Creek, at McClay Road bridge, 17/Sept/81, L&F, 1: TL 72 mm¹⁵; Warner Creek, at Diablo Road bridge, 17/Sept/81, L&F, 1: TL 170 mm¹⁴; Fairfax Creek, at Marin Road bridge, 18/Sept/81, L&F, 2: TL 70-96 mm¹⁰; Corte Madera Creek, downstream from Madrone Drive bridge, 18/Sept/81, L&F, 1: TL 88 mm⁸; Unnamed creek through San Rafael along 1st Street, between E and D Streets, 18/Sept/81, L&F, 2: TL 61-86 mm⁹; Old Mill Creek, at Locust Road bridge, 18/Sept/81, L&F, 5: TL 60-128 mm¹². NAPA COUNTY: Napa River, below Imola Avenue (West) bridge at Holiday Harbour boat dock, Napa, 30/May/63, J.D. Hopkirk, J. Shimizu, and A. Ota (CAS 23273, 3: SL 76-99 mm)²⁰; Tulacay Creek, at southern limits of Napa, Napa River, 26/May/65, J.D. Hopkirk, J. Shimizu, and D.H. Evans (CAS 24716, 5: SL 21.5-37.4 mm)²¹; Suisun Creek, off Gordon Valley Road, just below Lake Curry, 10/Aug/72, P.B. Moyle (UCDPM, 72-12, 1)²⁶; Napa Creek, at junction with Jefferson Street, Napa, 12/Sept/81, L&F, 3: TL 35-82 mm²³; Tulacay Creek, at junction with 4th Avenue, Napa, 12/Sept/81, L&F, 2: TL 37-44 mm²²; Milliken Creek, at West Trancas Road bridge, 12/Sept/81, L&F, 11: TL 36-85 mm²⁴; Sarco Creek, at junction with Hwy 121, 12/Sept/81, L&F,

4: TL 40-75 mm²⁵. SAN MATEO COUNTY: Corte Madera Creek (Snyder, 1905: 337); San Francisquito Creek (Snyder, 1905: 337); San Francisquito Creek, El Camino Real and SPRR bridge at Palo Alto, 13/May/38, L. Shapovalov (SU 68025, 5)⁸⁰; San Francisquito Creek, 1.5 miles above Junipero Serra Fwy 280, 13/Jul/76, CDFG, 2: FL 4.1-4.5 in.⁸⁴; San Francisquito Creek, 75 yds below Junipero Serra Fwy 280, 13/Jul/76, CDFG, 2: FL 2.8-3.5 in.⁸²; San Francisquito Creek, Lake Lagunitas diversion dam, 13/Jul/71, CDFG, 6: FL 3.4-4.5 in.⁸¹; Los Trancos Creek, Piers Lane crossing near confluence with San Francisquito Creek, 14/Jul/76, CDFG, 3: FL 3.2-4.2 in.⁸³; Bear Creek, 400 yds above Sand Hill Road bridge, 15/Jul/76, CDFG, 1: FL 5.9 in.⁸⁵. SANTA CLARA COUNTY: Adobe Creek, 1896-1898?, W.W. Thoburn and Johnson? (SU 4546, 4); San Antonio, Guadalupe and Coyote Creeks (Snyder, 1905: 337); Coyote Creek, near Gilroy Hot Springs, 25/Jul/09, U.S. Bureau of Fisheries (SU 37010, 1)⁵⁸; Coyote Creek, San Jose (in city), 1/Oct/22, C.L. Hubbs (UMMZ 63397, 6: 35-39 mm)⁷²; Coyote Creek, between Milpitas and Alviso, 24/Oct/22, C.L. Hubbs (UMMZ 63393, 71: 27-88 mm)⁷³; Coyote Creek, bridge opposite Milpitas, 16/Oct/32, W.I. Follett and party (CAS)⁷⁴; Palo Alto, 19/May/46, P. Chandler (CAS, Acc. 1959-VIII: 6A, 5: SL 13-19 mm)⁷⁹; Guadalupe Creek, at Coleman Road crossing (T8S, R1E, Sec 19), 24/Jul/53, T.J. Merkel (CAS 20983, 2)⁷⁶; San Francisquito Creek, downstream from golf course, Mar/56 (SJSU, SF-5); San Francisquito drainage, Mar/56 (SJSU, SF-6); Los Trancos Creek, 26/Jan/57 (SJSU, SF-13); Coyote Creek, Tully Road, 3/Mar/60 (SJSU, CD-19)⁷¹; Coyote Creek, below dam on Five Dot Ranch, 12/May/64, W.I. Follett (CAS, 10)⁷⁰; Coyote Creek, end of Cochrane Road at Anderson Dam, 12/May/64 W.I. Follett (CAS, 3)⁶¹; Coyote Creek (lat. 37°, 13', long. 121°, 45'), 21/Jun/73 (Aceituno et al., 1976: 204, 17: FL 31-119 mm)⁶⁷; Coyote Creek (lat. 37°, 10', long. 121°, 38'), 21/Jun/73 (Aceituno et al., 1976: 204, 4: FL 114-138 mm)⁶²; Coyote Creek, Riverside Golf Course (Scoppettone and Smith, 1978: 63)⁶⁵; Coyote Creek, upstream from Metcalf Road (Scoppettone and Smith, 1978: 63)⁶⁸; Arroyo Hondo Creek, Arroyo Hondo Road (Scoppettone and Smith, 1978: 63)⁵⁷; Matadero Creek, at junction with frontage road immediately below Bayshore Fwy, 18/Aug/81, L&F, 1: TL 41 mm⁷⁸; Los Gatos Creek, at Lack Avenue bridge off Hwy 17, 25/Aug/81, L&F, 3: TL 35-62 mm⁷⁷; Guadalupe River, at Camden Avenue, 26/Aug/81,

L&F, 12: TL 62-112 mm⁷⁵; Coyote Creek, at Coyote River Park, immediately below Anderson Dam, 3/Sept/81, L&F, 7: TL 60-95 mm⁶³; Coyote Creek, 2 km upstream from large gravel pits opposite San Bruno Avenue, 3/Sept/81, L&F, 5: TL 37-80 mm⁶⁴; Coyote Creek, 25 m upstream from junction with Metcalf Road, 3/Sept/81, L&F, 9: TL 37-88 mm⁶⁹; Coyote Creek, at milepost 6.12 E on Gilroy Hot Springs Road from junction with Canada Road (T10S, R5E, Sec 6), 5/Sept/81, L&F, 20: TL 25-59 mm⁵⁹; Canada de los Osos Creek, 1.25 miles upstream from junction of Canada Road and Gilroy Hot Springs Road (T10S, R5E, Sec 19), 5/Sept/81, L&F, 5: TL 27-42 mm⁶⁰; Fisher Creek, at Bailey Avenue bridge, 5/Sept/81, L&F, 1: TL 83 mm⁶⁶. SOLANO COUNTY: Mare Island, 1881, Jordan and Jouy (USNM 12963); Mare Island (Evermann and Latimer, 1910: 138)²⁷; Dutton Island, 20/Jul/57, W.I. Follett and G.M. Peckham (CAS 26744, 148); Green Valley Creek, at Interstate 80 bridge (T4N, R3W, Sec 1), 2/Oct/81, L&L, 12: TL 35-80 mm²⁹; Green Valley Creek, at SPRR bridge (T4N, R2W, Sec 7), 2/Oct/81, L&L, 5: TL 47-83 mm²⁸; Suisun Creek, at Cordelia Road, 2/Oct/81, L&L, 13: TL 32-83 mm³⁰. SONOMA COUNTY: Petaluma, 1855?, E. Samuels (UMMZ 171133, 1: 74 mm)¹⁷; Petaluma River, mouth near San Francisco Bay, 12/Dec/70, M. Brittan and class (SSU, F1977-366-1, 1)¹⁶; Sonoma Creek, 0.5 mile down Warm Springs Road from junction with Hwy 12 (Kenwood), 14/Sept/81, L&F, 2: TL 42-96 mm¹⁹; Carriger Creek, 0.5 mile south of junction with Canyon Road on Carriger Road, 14/Sept/81, L&F, 2: TL 42-57 mm¹⁸.

Cottus gulosus

Distributional Records. ALAMEDA COUNTY: Alameda Creek, junction with Calaveras Creek, 19/May/38, L. Shapovalov (CAS 24720, 1: SL 56 mm)²¹; San Leandro Creek, 100 m upstream from bridge entering Chabot Regional Park (west entrance below Chabot Dam), 22/Jul/81, L&F, 1: TL 27 mm¹⁹; San Leandro Creek, 30 m below spillway of Chabot Dam, 22/Jul/81, L&F, 11: TL 80-107 mm²⁰. CONTRA COSTA COUNTY: San Leandro Creek, north branch [Moraga Creek], between road crossing adjacent to firehouse on Moraga Way, 14/Aug/74, CDFG, 1: 1.5 in.¹⁶;

San Leandro Creek, west branch [Moraga Creek], concrete drop structure near Moraga Country Club, 15/Aug/74, CDFG, 2: 2-2.5 in.¹⁵; San Leandro Creek, 0.5 mile upstream from Upper San Leandro Reservoir (T1S, R3W, Sec 25), 4/Aug/81, L&F, 76: TL 26-82 mm¹⁴; Moraga Creek, south branch, 0.25 mile upstream from confluence with main branch, south of Moraga Intermediate School (T1S, R3W, Sec 25), 5/Aug/81, L&F, 3: TL 48-52 mm¹³; Moraga Creek, at junction of old Moraga Way (T1S, R2W, Sec 19), 5/Aug/81, L&F, 15: TL 36-74 mm¹⁷; Moraga Creek, immediately downstream from junction with Moraga Road, near BM 498, 7/Aug/81, L&F, 5: TL 33-73 mm¹⁸; Moraga Creek, at junction of Corlias Drive (T1S, R2W, Sec 18), 7/Aug/81, L&F, 1: TL 75 mm¹². MARIN COUNTY: Corte Madera Creek, at Lagunitas Road bridge, just W of Ross City Hall (37°, 51', 45"N, 122°, 32', 35"W), 1/Nov/63, SFSU, 4¹. NAPA COUNTY: Napa River, Rutherford (Snyder, 1908: 158)⁵; Napa River, Calistoga (Snyder, 1908: 158)⁴; Moore Creek, at Greenfield Ranch, 1.5 miles above junction with Chiles Creek, 30/Jul/45, B. Curtis (CAS 20938, 5: SL 44-58 mm)⁸; Moore Creek, 10/Aug/45, B. Curtis (CAS 20943, 12: SL 55-95 mm); Sage Creek, 15/Jul/50, H.E. Pintler (CAS 23087, 3: SL 38-69 mm); Conn Creek, 1.5 miles above Lake Hennessey, 9/Sept/81, L&F, 15: TL 27-61 mm⁷; Conn Creek, at milepost 8.07 E on Hwy 128, 10/Sept/81, L&F, 2: TL 34-41 mm⁶; Spencer Creek, at Wildhorse Valley Road, Napa (T5N, R3W, Sec 8), 12/Sept/81, L&F, 3: TL 43-54 mm¹¹; Murphy Creek, at junction with Shadybrook Lane (T5N, R3W, Sec 8), 12/Sept/81, L&F, 3: TL 40-50 mm¹⁰; Milliken Creek, at junction with Westgate Drive immediately before Milliken Drive (T6N, R4W, Sec 24), 12/Sept/81, L&F, 5: TL 27-40 mm⁹. SAN MATEO COUNTY: San Mateo Creek (Girard, 1854: 129)⁴³; "Streams of the Coast Range in California, south to Point Conception, San Francisquito Creek" (Jordan and Evermann, 1898: 1944); Los Trancos Creek, at junction with Arastradero Road, at Felt Lake diversion, 16/Aug/81, L&F, 4: TL 43-62 mm⁴². SANTA CLARA COUNTY: Coyote Creek (Fry, 1936: 67); Guadalupe Creek (Fry, 1936: 67); Penitencia Creek, at Piedmont Road crossing, 24/Jul/53, T.J. Merkel (CAS 20986, 2)³⁰; Penitencia Creek, just outside western boundary of Alum Rock Park (T6S, R1E, Sec 24), 24/Jul/53, T.J. Merkel (CAS 20988, 1)²⁹; Guadalupe Creek, Kelsey Pond, Coleman Avenue and Hicks Road, Apr/54, (SJSU, CD-1)³⁷; Guadalupe Creek, 1955, (SJSU, GD-3); Guadalupe Creek, 29/Oct/57, (SJSU, GD-7); Coyote Creek, 7/Mar/72, R.L. Hassur

(SJSU); Coyote Creek, middle fork (Guzzetta, 1974: 28)^{22,23,24}; Guadalupe Creek, 2-3 miles below Guadalupe Dam on Hicks Road (T8S, R1E, Secs 19 and 30), 14/Nov/75, CDFG³⁶; Coyote Creek, middle fork, Coe State Park (Scoppettone and Smith, 1978: 63)²⁵; Penitencia Creek, Alum Rock Park (Scoppettone and Smith, 1978: 63)²⁷; Upper Penitencia Creek, 0.6 km upstream from junction with Dutard Road near USGS BM 332, 11/Aug/81, L&F, 3: TL 55-86 mm²⁸; Guadalupe River, at Camden Avenue (T8S, R1E, Sec 19), 26/Aug/81, L&F, 1: TL 63 mm³⁵; Guadalupe River, at USGS gaging station on Hicks Road, above Camden Avenue (T8S, R1E, Sec 19), 26/Aug/81, L&F, 6: TL 27-122 mm³⁴; Guadalupe River, 50 m downstream from Guadalupe Dam, 26/Aug/81, L&F, 10: TL 35-70 mm³³; Rincon Creek, 50 m upstream from confluence with Guadalupe River (T9S, R1E, Sec 4), 26/Aug/81, L&F, 3: TL 41-52 mm³²; Guadalupe River, 20 m upstream from last junction with Hicks Road above Guadalupe Reservoir (T9S, R1E, Sec 4), 26/Aug/81, L&F, 4: TL 48-68 mm³¹; Coyote Creek, at milepost 6.40 E on Gilroy Hot Springs Road from junction with Canada Road (T10S, R5E, Sec 6), 5/Sept/81, L&F, 10: TL 25-59 mm²⁶; Los Gatos Creek, immediately upstream from junction with Hooker Gulch Creek on Aldercroft Road (T9S, R1W, Sec 15), 6/Sept/81, L&F, 4: TL 27-47 mm⁴⁰; Hooker Gulch Creek, 20 m upstream from confluence with Los Gatos Creek, on Aldercroft Road (T9S, R1W, Sec 15), 6/Sept/81, L&F, 2: TL 41-44 mm⁴¹; Los Gatos Creek, at Wrights Station Road bridge (T9S, R1W, Sec 23), 6/Sept/81, L&F, 2: TL 72-81 mm³⁹; Austrian Gulch Creek, 25 m upstream from bridge on NE arm of Lake Elsman (T9S, R1W, Sec 23), 6/Sept/81, L&F, 26: TL 35-59 mm³⁸. SONOMA COUNTY: Petaluma, as Cottopsis parvus (Girard, 1858: 54); Willow Brook Creek, Penngrove (J.D. Hopkirk, personal communication); Sonoma Creek, 0.5 mile down Warm Springs Road from junction with Hwy 12 (Kenwood), 14/Sept/81, L&F, 2: TL 45-121 mm²; Yulupa Creek, 0.25 mile upstream along Bennett Valley Road from junction with Warm Springs Road (T6N, R6W, Secs 7 and 8), 14/Sept/81, L&F, 3: TL 40-72 mm³.

Cottus aleuticus

Distributional Records. NAPA COUNTY: Conn Creek, from B.B. Ranch, downstream 3 miles, 31/Jul/45, B. Curtis, determined by L. Shapovalov, CDFG, 2:

juveniles³. SONOMA COUNTY: Petaluma River, Lakeville Hwy bridge, 19/Aug/80, CDFG (fish kill)².

Leptocottus armatus

Distributional Records. MARIN COUNTY: Corte Madera Creek, between Ross and San Anselmo, 15/May/65, SFSU, 2¹. NAPA COUNTY: Tulacay Creek, near Imola Avenue (West), Napa, 12/May/60, J.D. Hopkirk and J. Shimizu (CAS, Acc. 1962-VIII: 13, 2)⁴; Tulacay Creek, at Hwy 29 bridge on Imola Avenue (West), Napa, 22/Apr/66, A.M. Kuris and J.D. Hopkirk (CAS, Acc. 1966-VI: 20, 1: young)⁵; Napa River, above Bull Island, 20/May/76, CDFG, 1: FL 150 mm⁶. SONOMA COUNTY: Willow Brook Creek, near Petaluma (J.D. Hopkirk, personal communication).

Morone saxatilis

Distributional Records. ALAMEDA COUNTY: Cerrito Creek, upstream from Pierce Road bridge, 9/Jul/81, L&F, 1: FL 53 mm¹³. CONTRA COSTA COUNTY: Walnut Creek, immediately downstream from Hwy 4 crossing, 5/Oct/80, L&L, 1: 95 mm¹⁰; Walnut Creek, at confluence of Grayson Creek, 12/Oct/80, L&L, 2: TL 152-203 mm⁹; Garrity Creek, 0.25 mile upstream from 1st railroad crossing above San Pablo Bay, 7/Jul/81, L&F, 12: FL 25-55 mm¹¹; Garrity Creek, 25 m E of 2nd upstream railroad crossing above San Pablo Bay (T2N, R4W, Sec 20), 7/Jul/81, L&F, 8: FL 60-70 mm¹². NAPA COUNTY: Napa River, Imola, 24/Apr/27, W.I. Follett (CAS, Acc. 1927, 2: TL 7.5-9 in.)⁶; Tulacay Creek, near junction with Napa River, 4/May/59, P.R. Needham and party (CAS 23828, 1)⁴; Tulacay Creek, between railroad bridge and Imola Avenue (West), at southern limits of city of Napa, 26/May/65, J.D. Hopkirk, J. Shimizu, and D.H. Evans (CAS, Acc. 1966-VI: 20, 3: SL 108-136 mm)⁵; Napa River, Napa, 26/May/65, J.D. Hopkirk, J. Shimizu, and D.H. Evans (CAS, Acc. 1966-VI: 20, 2: SL 152-203 mm)³; Napa River, 0.5 mile section upstream from Lincoln Avenue bridge, Napa, 1/Nov/73, CDFG, 1: FL 180 mm²; Napa River, above Bull Island, 20/May/76, CDFG, 16: SL 220-550 mm⁷; Napa River,

between Mud Slough and Coon Island, 20/May/76, CDFG, 42: SL 180-430 mm⁸. SONOMA COUNTY: Petaluma River, Lakeville Hwy bridge, 19/Aug/80, CDFG, 4¹.

Archoplites interruptus

Distributional Records. ALAMEDA COUNTY: Calaveras Reservoir, 11/May/43, C.E. Holladay (CAS 20926, 1: SL 114 mm); Alameda Creek, dredger ponds, 23/Jan/53, W.I. Follett and party (CAS 25736, 3)⁸; Alameda Creek, 30/Jan/53, G. Oregon and P. Reno (CAS 25739, 3); Lake Anza, 5/Jun/53, W. Freihofer and party (CAS, 14: SL 16-34 mm); Alameda Creek, at WPRR bridge below Niles, 14/Oct/55, W.I. Follett and G.M. Peckham (CAS 26158, 81: young to large young)¹⁷; Alameda Creek, gravel pit pond (37°, 34', 121°, 59'), 14/Oct/55, W.I. Follett and G.M. Peckham (CAS, 2: young and yearling)⁹; Alameda Creek, ca. 100 yds below SPRR bridge below Niles, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS, Acc. 1955-X: 31, several large young)¹⁰; Alameda Creek, 0.2 mile above WPRR bridge below Niles, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS, 82: young to adult)¹⁸; Alameda Creek, pools opposite Niles nursery, 25/Mar/57, W.I. Follett and G.M. Peckham (CAS 26724, 4: SL 104-169 mm)¹¹; Alameda Creek, in pool at Niles Sand and Gravel Company, 4/Apr/57, W.I. Follett and G.M. Peckham (CAS 26729, 3: halfgrown)¹²; Alameda Creek, 0.4 mile above old Calif. Hwy 17, 0.2 mile above bridge of new fwy, 21/Jul/57, W.I. Follett and G.M. Peckham (CAS 26288, 52: young to small adults)¹⁹; Alameda Creek, just above bridge on new fwy near Niles, 21/Jul/57, W.I. Follett and G.M. Peckham (CAS 26292, 9: SL 27-120 mm)¹³; Alameda Creek, near Niles nursery, 31/Oct/58, W.I. Follett and G.M. Peckham (CAS 26371, 14: SL 35-170 mm)¹⁴; Lake Anza, 3/Feb/64, R.J. Angel (CAS 24702, 4: SL 109-128 mm); Creek tributary to Alameda Creek, Lowry Road and SPRR bridge, 22/Feb/66, J.D. Hopkirk and party (CAS 24701, 1: SL 86 mm)²⁰; Alameda Creek, at Niles, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 1: SL 39 mm)¹⁵; Alameda Creek, Niles Canyon, picnic ground at railroad bridge, 20/Feb/72, W.I. Follett (CAS, 1)⁶; Alameda Creek (lat. 37°, 34', long. 121°, 59', elev. 12 m), 20,21/Jun/73 (Aceituno et al., 1976: 199, 19: FL 71-199 mm)¹⁶; Arroyo de la Laguna Creek, down-

stream from Castlewood Road, 4/Feb/76, CDFG, 1: FL 162 mm⁵; Arroyo de la Laguna Creek, Castlewood Road (Scoppettone and Smith, 1978: 64)⁴; Alameda Creek, opposite USGS gaging station, below spillway, Niles Canyon (T4S, R1E, Sec 7), 1/Oct/81, L&F, 1: FL 42 mm⁷. SAN FRANCISCO COUNTY: San Francisco, as Ambloplites interruptus (Girard, 1858: 10); Lake Merced, San Francisco, 22/Oct/49, Springer (CAS 20608: 16). SAN MATEO COUNTY: "Francisquita" [San Francisquito Creek?], 1860, A. Agassiz (UMMZ 87164, 1: 146 mm)²⁴. SANTA CLARA COUNTY: Coyote Creek, San Jose (in city), 1/Oct/22, C.L. Hubbs (UMMZ 63336, 19: 22-35 mm)²²; Coyote Creek, San Jose (between Milpitas and Alviso), 24/Oct/22, C.L. Hubbs (MMZ 63335, 1: 36 mm)²³; Coyote Creek, at bridge opposite Milpitas, 16/Oct/32, W.I. Follett and party (CAS)²¹; Calaveras Reservoir, 11/May/43, C.E. Holladay (CAS 20926, 1: SL 114 mm); Coyote Creek, 7/Mar/59 (SJSU, CD-16). SOLANO COUNTY: Mare Island (Evermann, 1910: 137); Lake Curry or Chabot?, Vallejo (J.D. Hopkirk, personal communication).

Lepomis macrochirus

Distributional Records. ALAMEDA COUNTY: Alameda Creek, dredger ponds at Niles, 23/Jan/53, W.I. Follett and G.M. Peckham (CAS, Acc. 1953-I: 23, 2: halfgrown adults)⁹; Alameda Creek, gravel pit pond (lat. 37°, 34, long. 121°, 59'), 14/Oct/55, W.I. Follett and G.M. Peckham (CAS, 2: small adults)¹⁰; Alameda Creek, 0.2 mile above WPRR bridge below Niles, 31/Oct/55, W.I. Follett and G.M. Peckham (CAS 26163, 1: small adult)¹⁴; Alameda Creek, at pools opposite Niles nursery (Calif. Nursery Co.), 25/Mar/57, W.I. Follett and G.M. Peckham, 3: adults¹¹; Alameda Creek, near Niles nursery, 31/Oct/58, W.I. Follett and G.M. Peckham (CAS, numerous)¹²; Alameda Creek, at Niles, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 13: SL 22-72 mm)¹³; *San Lorenzo Creek, pool immediately below Don Castro Dam, 4,5/Aug/75, CDFG; Arroyo de la Laguna Creek, confluence with Alameda Creek, 4/Feb/76, CDFG, 5: FL 3.4-4.6 in.⁸; Arroyo Valle Creek, two ponds lying immediately to the S of Shadow Cliffs Reservoir, Jul/78, CDFG⁷; San Lorenzo Creek, at pool immediately below Cull Canyon Reservoir,

25/Jul/81, L&L, 2: FL 68-89 mm⁶. CONTRA COSTA COUNTY: Bear Creek, tributary SE side of San Pablo Reservoir, 4.5 miles from Orinda junction, 1/May/43, G. Murphy (SU, 39)⁵; *Marsh Creek, series of pools below Deer Valley Road, 19/Aug/75, CDFG; *Walnut Creek, near Duncan Street, 20,21/Jul/77, CDFG; *San Ramon Creek, lower reaches above confluence with Walnut Creek, 26/Jul/77, CDFG; Walnut Creek, 50 m upstream from SPRR bridge at Walnut Creek Civic Center, 5/Oct/80, L&L, 6: TL 93-108 mm⁴; Marsh Creek, on Marsh Creek Road 0.45 km W of junction with Orchard Lane, 11/May/81, L&L, 4: FL 39-71 mm³. MARIN COUNTY: *Stemple Creek [Estero de San Antonio], mouth to headwaters, 14/Jul/76, CDFG. NAPA COUNTY: Suisun Creek, large pools at foot of spillway of Lake Curry (Shapovalov, 1940: 13)²; Conn Creek, E of Oakville, 12/Apr/65, J.D. Hopkirk and party (J.D. Hopkirk, personal communication); *Hinman Creek, tributary to Dry Creek, 600 yds below garbage dump, 23,25/Jun/66, CDFG, a few; Napa River, Deer Park Road to 1/3 mile below Pope Street bridge, 16,17/Oct/79, CDFG (fish kill), 13¹. SAN MATEO COUNTY: *San Francisquito Creek, upstream from Junipero Blvd., 1,2,5/Jul/76, CDFG; Los Trancos Creek, channel under Fwy 280 bridge, Jun/78, CDFG: 13²⁵. SANTA CLARA COUNTY: Coyote Creek, 3/Mar/64 (SJSU, CD-22); Coyote Creek, below dam at Five Dot Ranch, 12/May/64, W.I. Follett (CAS, 1)²⁰; Coyote Creek, 22/Mar/73, R.L. Hassur (SJSU); Coyote Creek (Guzzetta, 1974: 28)¹⁶; Guadalupe River, Alma Street bridge, 26/Sept/75, CDFG, 1: FL 2.0 in.²²; Coyote Creek, northern portion of Hellyer Park, downstream from Sylvandale Road, 23/Sept/75, CDFG, 1: FL 1.9 in.²¹; Coyote Creek, below Anderson Reservoir (Scoppettone and Smith, 1978: 63)¹⁷; Coyote Creek, Riverside Golf Course Road (Scoppettone and Smith, 1978: 63)¹⁸; Coyote Creek, above and below Hellyer Park (Scoppettone and Smith, 1978: 63)²¹; Arroyo Bayo Creek, 1.2 km E of BM 1924 on San Antonio Road (T7S, R4E, Sec 5), 13/Aug/81, L&F, 18: FL 48-140 mm¹⁵; Hale Creek, on Fairway Drive on SE border of Los Altos Country Club golf course, 20/Aug/81, L&F, 56: FL 47-123 mm²⁴; Hale Creek, at junction of Covington Road (T6S, R2W, Sec 32), 20/Aug/81, L&F, 25: FL 32-100 mm²³; Coyote Creek, El Parque de la Raza de Paz at canal input, 1/Sept/81, L&F, 5: FL 37-80 mm¹⁹. SOLANO COUNTY: Suisun Creek, at Suisun Valley Road crossing immediately before Twin Sisters Gun Club turnoff (T5N, R2W, Sec 7), 2/Oct/81, L&L, 35: FL 90-105 mm²⁶. SONOMA COUNTY: *Petaluma Creek, north of Petaluma Blvd. bridge, 18/Jul/68, CDFG, 2.

Lepomis microlophus

Distributional Records. CONTRA COSTA COUNTY: Walnut Creek, pool below drop structure immediately downstream from Bancroft Road crossing, Walnut Creek, 23/Jun/78, CDFG, 12: 2-6 in.¹. SAN MATEO COUNTY: Sanchez Creek, upstream from Forest View Avenue, Hillsborough, 23/Aug/81, L&F, 2: FL 71-82 mm⁷. SANTA CLARA COUNTY: Coyote Creek, at Hwy 17 crossing, 31/Aug/81, L&F, 1: FL 172 mm³; Herbert Creek, at Alamitos and Hicks Road, 0.25 mile upstream from junction of Capitanicillos Creek, 3/Sept/81, L&F, 26: FL 60-92 mm⁶.

Lepomis gibbosus

Distributional Records. CONTRA COSTA COUNTY: San Ramon Creek, 50 m downstream from El Portal Road crossing, opposite Alamo Cemetery, 6/Oct/80, L&L, 3: FL 97-140 mm². SANTA CLARA COUNTY: Guadalupe Creek, near railroad crossing downstream from Willow Avenue, 1981, J. Smith, personal communication (SJSU, 8: young-of-the-year)⁴. SAN FRANCISCO COUNTY: Stow Lake (CAS, no date).

Lepomis cyanellus

Distributional Records. ALAMEDA COUNTY: Alameda Creek, near hwy bridge E of Niles, 18/Aug/61, J.D. Hopkirk, S. Mathews, and R. Behnke (CAS, Acc. 1961-IX: 2, common)³⁹; Creek tributary to Alameda Creek, Lowry Road and SPRR, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 2: SL 33-43 mm)³⁸; Arroyo de la Laguna Creek, 3 miles N of Sunol, 22/Feb/66, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 1: SL 39 mm)⁴⁰; Alameda Creek (lat. 37° 34', long. 121° 59'), 20,21/Jun/73 (Aceituno et al., 1976: 199, 20: FL 72-113 mm)⁴¹; Arroyo Mocho Creek, on Mines Road approximately 0.5 mile above intersection with Del Valle

Road (NW $\frac{1}{4}$ of Sec 6, T4S, R3E), 3/Feb/76, CDFG, 2: FL 190-193 mm⁵²; Arroyo Mocho Creek, Lawrence Laboratory pumping station (NE $\frac{1}{4}$ of Sec 8, T4S, R3E), 3/Feb/76, CDFG, 1: FL 120 mm⁴⁹; Arroyo de la Laguna Creek, downstream from Interstate 680, 9/Apr/76, CDFG, 1: FL 5.75 in.⁴⁵; Alameda Creek, 0.5 km upstream from junction with Calaveras Creek (Scoppettone and Smith, 1978: 64)⁴³; Alameda Creek, Sunol Park headquarters (Scoppettone and Smith, 1978: 64)⁴²; Arroyo Mocho Creek, Lawrence Laboratory pumping station (Scoppettone and Smith, 1978: 64)⁵⁰; Arroyo Mocho Creek, 1 km above Del Valle Road (Scoppettone and Smith, 1978: 64)⁵³; San Lorenzo Creek, 50 m upstream from 2nd Street crossing, Hayward, 23/Jul/81, L&F, 1: FL 176 mm³⁷; San Lorenzo Creek, 50 m downstream from junction with Crow Creek, 24/Jul/81, L&F, 15: FL 82-210 mm³²; San Lorenzo Creek, 30 m downstream from B Street bridge, Hayward, 25/Jul/81, L&L, 4: FL 112-150 mm³⁵; San Lorenzo Creek, 50 m upstream from B Street bridge, Hayward, 25/Jul/81, L&L, 1: FL 134 mm³⁶; San Lorenzo Creek, pool immediately below Cull Canyon Reservoir, 25/Jul/81, L&L, 2: FL 68-89 mm³³; Crow Creek, 2nd crossing of Crow Creek Road, 1 mile upstream from junction of Cull Canyon and Crow Canyon Road, 25/Jul/81, L&L, 10: FL 78-153 mm³¹; Palomares Creek, immediately below Don Castro Dam spillway, 25/Jul/81, L&L, 1: FL 114 mm³⁴; Arroyo las Positas Creek, 200 m downstream from junction with Cayetano Creek (T3S, R2E, Sec 6), L&L, 1: FL 52 mm⁴⁷; Altamont Creek, at 2nd upstream crossing of Blue Belle Drive (T2S, R2E, Sec 34), 26/Jul/81, L&L, 1: FL 110⁴⁸; Arroyo Mocho Creek, 0.7 km downstream from BM 2470 (T5S, R4E, Sec 16), 26/Jul/81, L&L, 3: FL 97-153 mm⁵⁴; Arroyo Mocho Creek, at junction with Hopyard Road, Pleasanton, 30/Jul/81, L&L, 1: FL 206 mm⁴⁶; Arroyo Mocho Creek, downstream from junction with Wente Road (T3S, R2E, Sec 22), 1/Aug/81, L&L, 1: FL 168 mm⁵¹. CONTRA COSTA COUNTY: San Ramon Creek, 1.8 miles above Walnut Creek (town), 3/Aug/45, W.I. Follett (CAS 19909, 1: SL 83 mm)²⁸; Pinole Creek, from tidal zone upstream 1.3 miles, 23/Apr/75, CDFG, 4: FL 2.5-3.5 in.³¹; *Tice Creek, at Lilac Drive, 12/Jul/76, CDFG, 1; *Walnut Creek, near Duncan Street, 20,21/Jul/77, CDFG, common; Walnut Creek, pool below drop structure immediately downstream from Bancroft Road bridge, 23/Jun/78, CDFG, 12: 2-6 in.²⁴; Wildcat Creek, 9/Nov/78, CDFG, 2; Walnut Creek, 50 m upstream from SPRR bridge at Walnut Creek Civic Center, 5/Oct/80, L&L, 2: TL 95-97 mm²⁵; San Ramon Creek, immediately

below Creekside Drive bridge at USGS gaging station, 5/Oct/80, L&L, 15: TL 108-191 mm²⁶; San Ramon Creek, below falls, 150 m downstream from junction with Chaney Road bridge, 5/Oct/80, R.A. Leidy, 1: TL 178 mm²⁷; San Ramon Creek, 0.3 km downstream from Alamo Cemetery, off La Gonda Way, 6/Oct/80, L&L, 5: TL 110-130 mm²⁹; San Ramon Creek, 50 m downstream from El Portal Road bridge, opposite Alamo Cemetery, 6/Oct/80, L&L, 9: TL 109-117 mm³⁰; Grayson Creek, 50 m upstream from Hwy 24 crossing, 12/Oct/80, L&L, 2: TL 25-178 mm²³; Marsh Creek, off Marsh Creek Road, approximately 0.45 km W of junction with Orchard Lane, 11/May/81, L&L, 17: FL 39-109 mm²². MARIN COUNTY: *Stemple Creek, mouth to headwaters, 14/Jul/76, CDFG. NAPA COUNTY: Suisun Creek, large pools at the foot of spillway of Lake Curry (Shapovalov, 1940: 13)¹⁹; *Chiles Creek, at gaging station just below the mouth of Moore Creek, 15/Jun/48, CDFG, 1; *Howell Creek, 2 miles above Derbfus Ranch, 14/May/58, CDFG, 6; Tulacay Creek, 5/May/60, P.R. Needham, J.D. Hopkirk, and D.W. Seegrist (CAS 23835, 1: SL 37 mm)¹⁸; Conn Creek, E of Oakville, 12/Apr/65, J.D. Hopkirk and party (J.D. Hopkirk, personal communication); Napa River, 2 miles N of Calistoga, 12/Apr/65, J.D. Hopkirk and party (J.D. Hopkirk, personal communication); *York Creek (T8N, R6W, Sec 25), 19/May/66, CDFG; *Carneros Creek, 26/May/66, CDFG; *Bell Canyon Creek, Bell Canyon Dam to mouth, 20/Jun/69, CDFG; Bell Canyon Creek, 100 ft upstream from confluence with S fork of Bell Canyon Creek, 18/Jul/69, CDFG, 3: FL 2.5-3.5 in.⁷; Napa River, Bale Lane bridge, 5/Aug/69, CDFG; Napa River, Berry Avenue bridge, 8/Aug/69, CDFG; *Garnett Creek, 1/Jul/70, CDFG; Suisun Creek, off Gordon Valley Road, just below Lake Curry, 10/Aug/72, P.B. Moyle (UCDPM, 72-12, 25-30)²⁰; *York Creek, in pools near Spring Mountain Road crossing, St. Helena, 13/Jun/74, CDFG, numerous; Milliken Creek, above falls between confluence with Milliken Reservoir and headwaters, 15/Jul/75, CDFG, 1; Bell Canyon Creek, Bell Canyon Dam to mouth, 17/Jul/75, CDFG, 2: 2 in.⁸; Milliken Creek, mouth of Milliken Canyon, CDFG, 9¹¹; Milliken Creek, junction of Atlas Peak Road, CDFG, 12¹²; Napa River, from Deer Park Road to 0.5 mile below Pope Street bridge, 16,17/Oct/79, CDFG, 132⁹; Napa River, at Tubbs Lane bridge, 9/Sept/81, L&F, 1: FL 201 mm³; Garnett Creek, at Grant Street bridge, 9/Sept/81, L&F, 2: FL 37-45 mm⁴; Napa River, at Dunaweal Lane bridge, 9/Sept/81, L&F, 4:

FL 98-192 mm⁵; Conn Creek, 50 m upstream from road crossing immediately above Hennessey Lake, 9/Sept/81, L&F, 7: FL 88-142 mm¹⁰; Napa Creek, at Jefferson Street bridge, 12/Sept/81, L&F, 2: FL 82-96 mm¹⁴; Brown's Valley Creek, at Buhman Avenue bridge, 12/Sept/81, L&F, 4: FL 60-96 mm¹⁵; Fagan Creek, 100 m downstream from Napa Road bridge, 12/Sept/81, L&F, 10: FL 27-50 mm¹⁷; Milliken Creek, upstream from West Trancas Road bridge, 12/Sept/81, L&F, 15: FL 55-113 mm¹³; Huichica Creek, pool downstream from Hwy 121 (12) bridge, 14/Sept/81, L&F, 1: FL 115 mm¹⁶. SAN MATEO COUNTY: *San Francisquito Creek, diversion channel leading to Lagunitas Lake on Stanford property (near fish ladder), 22/May/66, CDFG; *San Francisquito Creek, upstream from Junipero Serra Blvd., 1,2,5/Jul/76, CDFG; San Francisquito Creek, junction with Junipero Serra Blvd., 13/Jul/71, CDFG, 1: FL 6 in.⁶⁹; San Francisquito Creek, 20 m downstream from Willow Road bridge, 16/Aug/81, L&F, 1: FL 150 mm⁷⁰; Sanchez Creek, upstream from Forest View Avenue, Hillsborough, 23/Aug/81, L&F, 10: FL 56-179 mm⁷¹. SANTA CLARA COUNTY: San Francisquito drainage, Apr/56 (SFSU, SF-1, 8); Coyote Creek, 5/Nov/64 (SJSU, CD-26); Coyote Creek, 7/Mar/72, R.L. Hassur (SJSU); *Upper Penitencia Creek, below diversion dam above Toyon Road, 3/Jul/75, CDFG, 1: 4 in.; Coyote Creek, northern portion of Hellyer Park, downstream from Sylvandale Road, 23/Sept/75, CDFG, 1: FL 3 in.⁵⁷; Coyote Creek, downstream from Singleton Road crossing, 23/Sept/75, CDFG, 2: FL 2.5-3.0 in.⁶⁰; Coyote Creek, 100 yds. below Berryessa Road, 23/Sept/75, CDFG, 1: FL 3.3 in.⁶³; Coyote Creek, upstream from Oakland Road bridge near San Jose Municiple Golf Course, 23/Sept/75, CDFG, 1: FL 4.0 in.⁶⁵; Coyote Creek, large man-made pool downstream from Sylvandale Avenue, 19/May/77, CDFG⁵⁸; Coyote Creek, Riverside Golf Course Road (Scoppettone and Smith, 1978: 63)⁵⁶; Coyote Creek, above and below Hellyer Park (Scoppettone and Smith, 1978: 63)⁵⁹; Coyote Creek, Singleton Road (Scoppettone and Smith, 1978: 63)⁶¹; Coyote Creek, mouth of Penitencia Creek (Scoppettone and Smith, 1978: 63)⁶⁴; Coyote Creek, Hwy 237 (Scoppettone and Smith, 1978: 63)⁶⁶; Penitencia Creek, 1 to 3 km downstream from park (Scoppettone and Smith, 1978: 63)⁶²; Los Gatos Creek, at junction with Lack Avenue off Hwy 17, 25/Aug/81, L&F, 4: FL 85-100 mm⁶⁷; Stevens Creek, 25 m upstream from Stevens Creek Road, 19/Aug/81, L&F, 1: FL 165 mm⁶⁸. SOLANO COUNTY: Suisun Creek, at Suisun Valley

Road bridge immediately before Twin Sisters Gun Club turnoff (T5N, R3W, Sec 7), 2/Oct/81, L&L, 2: FL 78-84 mm²¹. SONOMA COUNTY: Petaluma River, at Pennngrove bridge (city park), 15/Sept/81, L&F, 7: FL 98-181 mm¹; Petaluma River, 25 m upstream from Hardin Lane bridge, 16/Sept/81, L&F, 3: FL 42-67 mm².

Pomoxis annularis

Distributional Records. NAPA COUNTY: Sage Creek, at milepost 11.68 on Hwy 128 above Lake Hennessey, 10/Sept/81, L&F, 1: FL 72 mm².

Pomoxis nigromaculatus

Distributional Records. ALAMEDA COUNTY: Alameda Creek, near Niles nursery, 31/Oct/58, W.I. Follett and G.M. Peckham (CAS)⁵; Palomares Creek, 200 m downstream from Don Castro Dam, 25/Jul/81, L&L, 1: FL 102 mm⁶; Palomares Creek, immediately below Don Castro Dam spillway, 25/Jul/81, L&L, 2: FL 91-96 mm⁷. NAPA COUNTY: Suisun Creek, near Lake Curry, 4 miles NW of Manka, 3/Mar/40, T. Rodgers (UMMZ 131515)⁴; Conn Creek, E of Oakville on Oakville Road, 12/Apr/65, J.D. Hopkirk and party (J.D. Hopkirk, personal communication); Tulacay Creek, between railroad bridge and Imola Avenue (West), at southern limits of the city of Napa, 26/May/65, J.D. Hopkirk and party (CAS, Acc. 1966-VI: 20, 2: SL 94.7-215.4 mm)³; Sage Creek, at milepost 11.68 on Hwy 128 above Lake Hennessey, 10/Sept/81, L&F, 4: FL 76-84 mm¹. SANTA CLARA COUNTY: Coyote Creek, below Coyote Reservoir (Scoppettone and Smith, 1978: 63)⁸; Los Gatos Creek, at Lark Avenue bridge off Hwy 17, 25/Aug/81, L&F, 1: FL 92 mm¹⁰; Guadalupe River, at Branham Lane, 26/Aug/81, L&F, 6: FL 44-96 mm⁹.

Micropterus salmoides

Distributional Records. ALAMEDA COUNTY: Palomares Creek, 200 m downstream from Don Castro Dam, 21/Jul/81, L&L, 1: FL 147 mm¹¹; Palomares Creek, immediately

below Don Castro Dam spillway, 25/Jul/81, L&L, 1: FL 175 mm¹²; San Lorenzo Creek, pool immediately below Cull Canyon Reservoir, 25/Jul/81, L&L, 1: FL 54 mm¹³; San Lorenzo Creek, 100 m upstream from Hwy 580, 25/Jul/81, L&L, 1: FL 160 mm¹⁴; Alameda Creek, at USGS gaging station below spillway, Niles Canyon (T4S, R1E, Sec 7), 1/Oct/81, L&F, 3: FL 120-162 mm. CONTRA COSTA COUNTY: *San Pablo Creek, 1.5 miles downstream from Orinda Filtration Plant, 4/Jun/76, CDFG, 2; Moraga Creek, 25 m upstream from bridge at Valle Vista staging area along Canyon Road (T1S, R2W, Sec 19), 5/Aug/81, L&F, 4: FL 40-58 mm⁷; Moraga Creek, 200 m upstream from confluence of S branch near Moraga Intermediate School (T1S, R2W, Sec 19), 5/Aug/81, L&F, 52: FL 41-73 mm⁸; Moraga Creek, 0.2 km upstream from Canyon Road bridge, 7/Aug/81, L&F, 13: FL 48-105 mm⁹. NAPA COUNTY: Napa River, 2 miles N of Calistoga, 12/Apr/65, J.D. Hopkirk and party (J.D. Hopkirk, personal communication); Sage Creek, at milepost 11.68 on Hwy 128 above Lake Hennessey, 10/Sept/81, L&F, 2: FL 66-92 mm¹. SAN MATEO COUNTY: San Francisquito Creek drainage, Mar/56 (SJSU, SF-3). SANTA CLARA COUNTY: Coyote Creek, 0.4 mile by road downstream from Gilroy Hot Springs Road and Canada Road (T10S, R4E, Sec 12), 23/Jul/53, T.J. Merkel (CDFG, 20+)³⁹; Coyote Creek, 2.4 miles downstream from junction of Gilroy Hot Springs Road and Canada Road (T10S, R4E, Sec 1), 23/Jul/53, T.J. Merkel (CDFG)³⁸; Coyote Creek, 1.5 miles by road upstream from junction of Gilroy Hot Springs Road and Canada Road (T10S, R5E, Sec 7), 23/Jul/53, T.J. Merkel (CDFG, 25: adult)⁴⁰; Coyote Creek drainage, 6/Oct/55 (SJSU, CD-10); Coyote Creek drainage, 5/Nov/64 (SJSU, CD-27); Coyote Creek, below dam at Five Dot Ranch, 12/May/64, W.I. Follett (CAS, 1)³⁵; Coyote Creek, between Coyote Reservoir and Gilroy Hot Springs, 5/Sept/65, R.N. and M. Lea (CAS, Acc. 1967-I: 9, 1: 6 in.); Coyote Creek, 7/Mar/72, R.L. Hassur (SJSU); Coyote Creek, northern portion of Hellyer Park, downstream from Sylvania Road, 23/Sept/75, CDFG, 2: FL 2.3-2.4 in.³¹; *Coyote Creek, large man-made pool downstream from Sylvandale Avenue, 19/May/77, CDFG, several; Coyote Creek, Riverside Golf Course Road (Scoppettone and Smith, 1978: 63)³⁷; Coyote Creek, above and below Hellyer Park (Scoppettone and Smith, 1978: 63)³²; Arroyo Bayo Creek, 1.2 km E of USGS BM 1924 on San Antonio Road (T7S, R4E, Sec 5), 25/Aug/81, L&F, 5: FL 200-288 mm⁴¹; Los Gatos Creek, at junction with Lack Avenue off Hwy 17,

25/Aug/81, L&F, 1: FL 145 mm⁴⁴; Guadalupe Creek, at Branham Lane, 26/Aug/81, L&F, 1: FL 52 mm⁴²; Coyote Creek, at Hellyer Park, 1/Sept/81, L&F, 2: FL 41-62 mm³⁴; Coyote Creek, at El Parque de la Raza de Paz at canal input, 1/Sept/81, L&F, 3: FL 60-94 mm³³; Coyote Creek, 0.75 km upstream from Coyote (town) on wildlife reserve, 3/Sept/81, L&F, 5: FL 41-79 mm³⁶.

Micropterus dolomieu

Distributional Records. ALAMEDA COUNTY: Alameda Creek, 1874 (Shebley, 1917); San Lorenzo Creek, at junction of 2nd Street, Hayward, 23/Jul/81, L&F, 1: FL 41 mm²²; Palomares Creek, 200 m downstream from Don Castro Reservoir Dam, 25/Jul/81, L&L, 5: FL 46-67 mm¹⁵; Palomares Creek, immediately below Don Castro Reservoir spillway, 25/Jul/81, L&L, 2: FL 58-125 mm¹⁶; Alameda Creek, opposite Kaiser aggregate quarry (T4S, R1W, Sec 12), 1/Oct/81, L&F, 1: FL 102 mm²⁶. NAPA COUNTY: Napa Creek [River?], 1874 (Shebley, 1917); Napa River, 0.6 mile section upstream from Lincoln Avenue bridge, 1/Nov/71, CDFG, 1: FL 180 mm⁶; Napa River, from Deer Park Road to 1/3 mile below Pope Street bridge, 16,17/Oct/79, CDFG (fish kill), 120⁴; Conn Creek, 50 m upstream from road crossing immediately above Hennessey Lake, 9/Sept/81, L&F, 11: FL 48-86 mm³; Napa River, at Yountville Cross Road, 10/Sept/81, L&F, 3: FL 52-96 mm⁵; Sage Creek, at milepost 11.68 on Hwy 128 above Hennessey Lake, 10/Sept/81, L&F, 12: FL 60-82 mm². SANTA CLARA COUNTY: Los Gatos Creek, at Lack Avenue bridge off Hwy 17, 25/Aug/81, L&F, 3: FL 55-68 mm⁴³.

Percina macrolepida

Distributional Records. ALAMEDA COUNTY: Del Valle Reservoir (California Department of Water Resources, 1974, 26)²; Arroyo Mocho Creek, pool immediately below Wente Road (T3S, R2E, Sec 22), 27/Jul/81, L&F, 1: FL 121 mm¹.

Hysterocarpus traskii

Distributional Records. ALAMEDA COUNTY: Alameda Creek, Sunol, 15/Jun/98,

J.O. Snyder (CNHM 2597, 27: 2 adult and 25 young; J.D. Hopkirk, personal communication); Alameda Creek, 1898, J.O. Snyder (SU 5929, 18)¹⁸; Alameda Creek (Snyder, 1905: 337); Alameda Creek, immediately below dam in Niles Canyon, 24/Jul/27, W.I. Follett (CAS, Acc. 1927, several adults, many young)¹⁹; Alameda Creek, immediately below dam in Niles Canyon, 31/Jul/27, W.I. Follett (CAS, Acc. 1927, 2: adults)²⁰; Alameda Creek, 1934 (Seale, 1934: 152); Alameda Creek, Sunol (Tarp, 1952: 80)²²; Alameda Creek, BART crossing, 1977, J.J. Smith (personal communication; SJSU, abundant)²³; Alameda Creek, below spillway opposite USGS gaging station, Niles Canyon (T4S, R1E, Sec 7), 1/Oct/81, L&F, 1: FL 115 mm²¹.

CONTRA COSTA COUNTY: Hastings Slough, near Port Chicago, 21/Oct/62, D. Stevens (CAS, Acc. 1964-XI: 13: 1, SL 62 mm).

MARIN COUNTY: Corte Madera Creek, at mouth, J.P. Mackey and E.W. Kirschbaum (SFSU, 3: SL 32-33 mm; in Hopkirk, 1973: 84)¹.

NAPA COUNTY: Conn Creek, listed as H. traski (Snyder, 1908: 160)¹⁵; Napa River, Calistoga, as H. traski (Snyder, 1908: 160)³; Napa River, near mouth of Tulacay Creek, 4/May/59, P.R. Needham, J.D. Hopkirk, D. Seegrist and party (CAS 22788, 122: SL 25-88 mm)¹²; Tulacay Creek, 4/May/59, P.R. Needham, J.D. Hopkirk, D. Seegrist and party (CAS 22792, 8)¹¹; Tulacay Creek, between Imola Avenue (West) and Napa River, 16/Mar/60, P.R. Needham and party (CAS 22789, 41: SL 91-147 mm)⁴; Tulacay Creek, between Imola Avenue (West) and Napa River, 1/Apr/60, P.R. Needham, D.W. Seegrist and J.D. Hopkirk (CAS 22790, 41: SL 91-147 mm)⁵; Napa River, near mouth of Tulacay Creek, 12/May/60, J.D. Hopkirk and J. Shimizu (CAS 22800, 21: SL 30-132 mm); Tulacay Creek, near mouth, 1/May/61, J.D. Hopkirk and party (CAS 22792, 8: young adults, SL 24-92 mm)⁶; Napa River, below Imola Avenue (West) bridge, at Holiday Harbor boat dock, Napa, 30/May/63, J.D. Hopkirk, J. Shimizu, and A. Ota (CAS 23272, 13: 27-40 mm)⁷; Tulacay Creek, between railroad bridge and Imola Avenue (West) at southern limits of city of Napa, 26/May/65, J.D. Hopkirk, J. Shimizu, and D.H. Evans (CAS, Acc. 1966-VI: 20, 11: SL 116-134 mm)⁸; Napa River, adjacent to mouth of Tulacay Creek at southern limits of city of Napa, 26/May/65, J.D. Hopkirk, J. Shimizu, and D.H. Evans (CAS, Acc. 1966-VI: 20, 47: SL 31.2-46.3 mm)⁹; Tulacay Creek, at Napa, 22/Apr/66, A.M. Kuris, R. Berta and J.D. Hopkirk (CAS, Acc. 1966-VI: 20, 10: SL 82-118 mm)¹⁰; Napa River, above Bull Island, 20/May/76, CDFG,

3: FL 120-170 mm¹³; Napa River, Mud Slough and Coon Island, 20/May/76, CDFG, 18: FL 120-190 mm¹⁴. SAN MATEO COUNTY: "Valley" (?Crystal) Springs Lake (apparently introduced) (CAS, 14: in Hopkirk, 1973: 84)²⁸. SANTA CLARA COUNTY: Coyote Creek, near San Jose, 25/Sept/95, Heath and Abbott (SU 5007, 20)²⁵; Coyote Creek (Snyder, 1905: 337); Coyote Creek, San Jose, 1/Oct/22, C.L. Hubbs (UMMZ 63287, 20: 43-74 mm)²⁶; Coyote Creek, San Jose (in city), 1/Oct/22, C.L. Hubbs (UMMZ 63392, 415: 24-107 mm)²⁷; Coyote Creek, between Milpitas and Alviso, 24/Oct/22, C.L. Hubbs (UMMZ 63288, 4: SL 53-79 mm)²⁴; Coyote Creek, 1/Sept/25 (SJSU, CD-21). SOLANO COUNTY: Dutton Island, 20/Jul/57, W.I. Follett and G.M. Peckham (CAS 26280, 260: SL 35-63 mm); Green Valley Creek, at Hwy 80 bridge (T4N, R3W, Sec 1), 2/Oct/81, L&L, 11: FL 69-105 mm¹⁶; Green Valley Creek, at SPRR bridge (T4N, R2W, Sec 7), 2/Oct/81, L&L, 1: FL 100 mm¹⁷. SONOMA COUNTY: Black Point, near mouth of Petaluma River, Dec/11, H.Z. Nidaver (SU, 1)².

Eucyclogobius newberryi

Distributional Records. ALAMEDA COUNTY: Berkeley Aquatic Park, summer 1950 (CAS, Acc. 1964-XI: 13:1). MARIN COUNTY: Novato Creek, at bridge on Hwy 101, 19/Jul/45, D. Simpson (CAS 12995, 20: half grown)¹; Lagoon, Corte Madera, behind Council Crest Street, 15/May/58, E.W. Kirschbaum (CAS, Acc. 1958-VIII: 9: 1); Corte Madera Creek, vicinity of Kentfield bridge, 50 yds downstream, 28/Oct/61, E.W. Kirschbaum (CAS, Acc. 1961-XI: 26, 41: SL 26-34 mm)²; Rodeo Lagoon, Ft. Cronkite, 17/Mar/69, W.W. Schneebeli and F. Herms (CAS, Acc. 1969-VII: 16). SAN FRANCISCO COUNTY: Lake Merced, 1/Nov/95 (CAS 12483: 2, dessicated).

Gillichthys mirabilis

Distributional Records. ALAMEDA COUNTY: Plummer Creek, South San Francisco Bay, 17/Aug/66, P. Wild and Apler (CAS, Acc. 1967-II: 2, SL 73.5 mm)¹². CONTRA COSTA COUNTY: Garrity Creek, 0.25 mile upstream from AT + SF railroad bridge above San Pablo Bay, 7/Jul/81, L&F, 1: FL 50 mm⁶. MARIN

COUNTY: Corte Madera Creek, 27/Jun/59, E.S. Kirschbaum and T. Dewit (CAS 26360, 1)³. SONOMA COUNTY: Slough, north of Sears Point Road, 4/Jun/63, J.D. Hopkirk and C.C. Swift (CAS, Acc. ?, 7: SL 12-23 mm).

Acanthogobius flavimanus

Distributional Records. ALAMEDA COUNTY: Plummer Creek, South San Francisco Bay, 26/May/66, P. Wild (CAS, Acc. 1967-III: 2,3: SL 24.2-30.7 mm)¹⁰; Plummer Creek, South San Francisco Bay, 22/Jul/66, P. Wild (CAS, Acc. 1967: 2: SL 44-64 mm)¹¹; Abundant in Berkeley Aquatic Park (J.D. Hopkirk, 1982, personal observation). CONTRA COSTA COUNTY: Walnut Creek, immediately downstream from Hwy 4 bridge, 5/Oct/80, L&L, 3: FL 127-152 mm⁹; Walnut Creek, at confluence of Grayson Creek, 12/Oct/80, L&L, 9: FL 127-178 mm⁸; Pinole Creek, 0.5 km upstream from AT + SF railroad bridge, 25,26/Jun/81, L&F, 1: FL 137 mm⁴; Garrity Creek, 0.25 mile upstream from AT + SF railroad bridge above San Pablo Bay, 7/Jul/81, L&F, 3: FL 80-150 mm⁵; Arroyo Hambre Creek, at Berkeley Street, Martinez, 24/Aug/81, L&F, 2: FL 107-147 mm⁷. SAN MATEO COUNTY: Belmont Creek, immediately downstream from Industrial Road (T5S, R4W, Sec 2), 17/Aug/81, L&F, 1: FL 181 mm¹⁵. SOLANO COUNTY: Green Valley Creek, at SPRR bridge (T4N, R2W, Sec 7), 2/Oct/81, L&L, 2: FL 99-110 mm¹³. SONOMA COUNTY: Petaluma River, Lakeville Hwy bridge, 19/Aug/80, CDFG (fish kill), 2817¹⁴.

LITERATURE CITED

- ACEITUNO, M. E., M. L. CAYWOOD, and S. J. NICOLA
1973. A survey of the fishes of the Central Valley, California. Unpublished manuscript, Calif. Fish, Game.
- ACEITUNO, M. E., M. L. CAYWOOD, S. J. NICOLA, and W. I. FOLLETT
1976. Occurrence of native fishes in Alameda and Coyote Creeks, California. Calif. Fish, Game 62(3): 195-206.
- AMERICAN FISHERIES SOCIETY
1980. A list of common and scientific names of fishes from the United States and Canada. 4th ed. Amer. Fish. Soc. Spec. Publ. No. 7.
- ARNOLD, K.
1973. Comparison of spawning activity of rainbow trout in San Leandro and Redwood Creeks. Unpublished manuscript, University of California, Berkeley.
- AVISE, J. C., J. J. SMITH, and F. J. AYOLA
1975. Adaptive differentiation with little genic change between two native California minnows. Evolution 29:411-26.
- AYRES, W. O.
1855. Description of *Salmo rivularis* and *Petromyzon ciliatus*. Proc. Calif. Acad. Nat. Sci. 1(1):43-45.
- BRITTAN, M., A. ALBRECHT, and J. HOPKIRK
1963. An oriental goby collected in the San Joaquin River delta near Stockton, California. Calif. Fish, Game 49(4):302-04.
- BRITTAN, M., J. HOPKIRK, J. CONNERS, and M. MARTIN
1970. Explosive spread of the oriental goby, *Acanthogobius flavimanus* in the San Francisco Bay-Delta regions of California. Proc. Calif. Acad. Sci. 38(11):207-14.
- CALIFORNIA DEPARTMENT OF WATER RESOURCES
1974. Reconnaissance study of the natural resources of the Arroyo Del Valle Basin, Alameda and Santa Clara counties. Central District. 53 pp.
- CAYWOOD, M. L.
1974. Contributions to the life history of the splittail *Pogonichthys macrolepidotus*. Unpublished M.S. thesis, Sacramento State University. 91 pp.
- CHIANG, C., and S. SELVIN
1980. Text for Bioenvironmental Engineering 160ABC. Unpublished mimeo, University of California, Berkeley.
- COOPER, J. J.
1983. Distributional ecology of native and introduced fishes in the Pit River System, northeastern California, with notes on the Modoc sucker. Calif. Fish, Game 69(1):39-53.
- DILL, W. A.
1938. Creel census at Stevens Creek. Calif. Div. Fish, Game. 17 pp.
- EIGENMANN, C. H.
1890. The food fishes of California fresh waters. Biennial Rpt. Calif. Fish. Comm., 1888-1890, pp. 53-65.
- EVERMANN, B. W., and H. B. LATIMER
1910. On a collection of fishes from the Olympic Peninsula, together with notes on other West Coast species. Proc. Biol. Soc. Wash. 23:131-40.
- EVERMANN, B. W., and H. W. CLARK
1931. A distributional list of the species of freshwater fishes known to occur in California. Calif. Fish, Game Bull. 35. 67 pp.
- FRY, D. H.
1936. Life history of *Hesperoleucas venustus* Snyder. Calif. Fish, Game 22(2):65-98.
1973. Anadromous fishes of California. Calif. Dept. Fish, Game. 112 pp.
- GIBBONS, W. P.
1855. Description of a new trout. Proc. Acad. Nat. Sci. 1(1):35-36.
- GIRARD, C.
1854. Descriptions of new fishes, collected by Dr. A. L. Meerman, naturalist attached to the survey of the Pacific railroad route under Lieut. R. S. Williamson, USA. Proc. Acad. Nat. Sci. Phila. 7:129-40.
1857a. A list of fishes collected by Mr. E. Samuels with descriptions of the new species. Boston J. Nat. Hist., Vol. 6, Art. 28, pp. 533-44.
1857b. Report upon fishes collected on the survey. In Reports of explorations and surveys to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean 6(4):9-34. U.S. House Rep. Ex. Doc. No. 91, 33rd Congr., 2nd Session, Washington, D.C.
1859. Reports of explorations and surveys to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean. 33rd Congress, 2nd Session, Ex. Doc. No. 78, Fishes: Vol. X, Pt. 4, 400 pp.

- GUZZETTA, D. J.
1974. A preliminary survey of the aquatic habitat of Henry W. Coe State Park with management proposals. M.A. thesis, San Jose State University, California.
- HALLOCK, R. J., and D. H. FRY, JR.
1967. Five species of salmon, *Oncorhynchus*, in the Sacramento River, California. *Calif. Fish, Game* 53(1):5-22.
- HOPKIRK, J. D.
1973. Endemism in fishes of the Clear Lake Region. *Univ. Calif. Publ. Zool.* 96. 160 pp.
- HUBBS, C. L.
1924. The life-cycle and growth of lampreys. *Papers Mich. Acad. Sci., Arts, Letters* (1):587-603.
- HUBBS, C. L., and R. R. MILLER
1965. Study of cyprinodont fishes. XXII. Variation in *Lucania parva*, its establishment in western United States, and description of a new species from an interior basin in Coahuila, Mexico. *Univ. Mich. Zool. Misc. Publ.* 127. 104 pp.
- HUBBS, C. L., W. I. FOLLETT, and L. J. DEMPSTER
1979. List of fishes of California. *Occ. Papers Calif. Acad. Sci.* 133. 51 pp.
- JORDAN, D. S.
1907. The trout and salmon of the Pacific coast. *Rpt. State Board Fish Comm. Calif., 1905-1906*, pp. 77-92.
- JORDAN, D. S., and C. H. GILBERT
1881. Notes on the fishes of the Pacific coast of the United States. *Proc. U.S. Nat. Mus.*, 1881, 4:29-70.
- JORDAN, D. S., and P. L. JOUY
1881. Check-list of duplicates of fishes from the Pacific coast of North America, distributed by the Smithsonian Institution in behalf of the United States National Museum, 1881. *Proc. U.S. Nat. Mus.*, 1881, 4:1-18.
- LEIDY, R. A.
1983. Distribution of fishes in streams of the Walnut Creek basin, California. *Calif. Fish, Game* 69(1):23-32.
- LOCKINGTON, W. N.
1879. Report upon the food fishes of San Francisco. *Rpt. Calif. Fish. Comm.*, 1878-1879, pp. 17-58.
- MILLER, R. R.
1963. Synonymy, characters, and variation of *Gila crassicauda*, a rare California minnow, with an account of its hybridization with *Lavinia exilicauda*. *Calif. Fish, Game* 49(1):20-29.
- MILLS, T. J., and K. A. MAMIKA
1980. The thicktail chub, *Gila crassicauda*, an extinct California fish. *Calif. Fish, Game Inland Fisheries Endangered Species Program, Sec. Publ.* 80-82. 21 pp.
- MOYLE, P. B.
1976a. Inland fishes of California. Berkeley: University of California Press. 405 pp.
1976b. Fish introductions in California: history and impact on native fishes. *Biol. Conserv.* 9:101-18.
- MOYLE, P. B., and R. NICHOLS
1973. Ecology of some native and introduced fishes of the Sierra Nevada foothills in central California. *Copeia* 3:478-90.
1974. Decline of the native fish fauna of the Sierra Nevada foothills, central California. *Amer. Midl. Nat.* 92(1):72-83.
- MOYLE, P. B., J. J. SMITH, R. A. DANIELS, T. L. TAYLOR, D. G. PRICE, and D. M. BALTZ
1982. Distribution and ecology of stream fishes of the Sacramento-San Joaquin drainage system, California. *University of California Publ. Zool.* Vol. 15. Berkeley: University of California Press. 256 pp.
- MURPHY, G.
1943. Distribution and variation of the roach (*Hesperoleucus*) in the coastal region of California. M.S. thesis, University of California, Berkeley. 55 pp.
- NEEDHAM, P. R., and R. GARD
1959. Rainbow trout in Mexico and California, with notes on the cutthroat series. *University of California Publ. Zool.* 67(1). 55 pp.
- RUTTER, C.
1908. The fishes of the Sacramento-San Joaquin basin, with a study of their distribution and variation. *Bull. U.S. Bur. Fish.* 27(637):103-52.
- SCOPPETTONE, G. C., and J. J. SMITH
1978. Additional records on the distribution and status of native fishes in Alameda and Coyote creeks, California. *Calif. Fish, Game* 64(1):62-65.
- SHAPOVALOV, L.
1940. Report on four reservoirs in Napa and Solano counties. *Calif. Div. Fish, Game.* 17 pp.
1942. Creel census at Stevens Creek and Stevens Creek Reservoir, Santa Clara County. *Calif. Div. Fish, Game.* 16 pp.

1943. Creel census at Stevens Creek and Stevens Creek Reservoir, Santa Clara County. Calif. Div. Fish, Game. 14 pp.
1944. Creel census at Stevens Creek and Stevens Creek Reservoir, Santa Clara County. Calif. Div. Fish, Game. 23 pp.
1945. Creel census at Stevens Creek and Stevens Creek Reservoir, Santa Clara County. Calif. Div. Fish, Game. 24 pp.
1946. Creel census at Stevens Creek and Stevens Creek Reservoir, Santa Clara County. Calif. Div. Fish, Game. 41 pp.
- SHAPOVALOV, L., W. A. DILL, and A. J. CORDONE
1959. A revised checklist of the freshwater and anadromous fishes of California. Calif. Dept. Fish, Game 45(3):155-80.
- SHEBLEY, W. H.
1917. History of the introduction of food and game fishes into the waters of California. Calif. Fish, Game 3(1):3-12
- SKINNER, J. E.
1962. An historical view of the fish and wildlife resources of the San Francisco Bay area. Calif. Dept. Fish, Game Water Projects Branch Rpt. 1. 225 pp.
- SNYDER, J. O.
1905. Notes on the fishes of the streams flowing into the San Francisco Bay. Rept. Bur. Fish App. 5:327-38.
1908. The fishes of the coastal streams of Oregon and northern California. Bull. U.S. Fish. 27:153-89.
1913. The fishes of the streams tributary to Monterey Bay, California. Bull. U.S. Fish. 32, 1912:49-72.
- SOKAL, R. R., and F. J. ROHLF
1981. Biometry: The principles and practice of statistics in biological research. San Francisco: W. H. Freeman. 859 pp.
- TAFT, A. C.
1928. Age and growth of *Ptychocheilus grandis*, a western minnow. M. A. thesis, Stanford University.
- TAFT, A. C., and G. I. MURPHY
1950. The life history of the Sacramento squawfish (*Ptychocheilus grandis*). Calif. Fish, Game 36(2): 147-64.
- TURNER, J. L., and D. W. KELLEY
1966. Ecological studies of the Sacramento-San Joaquin Delta, Part III. Calif. Dept. Fish, Game Bull. 136. 168 pp.

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